



Rapid Evidence Product

June 2025

Misuse of ADHD Prescription Stimulants in Adults



Background and Purpose

The U.S. Food and Drug Administration (FDA) commissioned a rapid review, through the Agency for Healthcare Research and Quality's Evidence-based Practice Center program, on the misuse of attention-deficit/hyperactivity disorder (ADHD) prescription stimulant medications in adults to understand the patterns and trends in misuse and its short- and long-term health consequences. The National Institute on Drug Abuse (NIDA) defines misuse as "taking a medication in a manner or dose other than prescribed; taking someone else's prescription, even if for a legitimate medical complaint such as pain; or taking a medication to feel euphoria (i.e., to get high)."¹ The term *nonmedical use* is generally synonymous with *misuse*. This rapid review focuses on the epidemiology and adverse health consequences of misuse of stimulants commonly prescribed for ADHD, as well the role of these medications in polysubstance abuse.

This report may inform the FDA's efforts to protect the public health and inform regulatory decision making by understanding the prevalence and consequences of prescription stimulant misuse and the pathways, if any, from the misuse of prescription stimulants to use and abuse of illicit drugs.



Methods

The section contains a summary of the project methods; Appendix A contains a full description. The project followed a detailed protocol which is registered in PROSPERO (CRD42024627066).

The FDA provided three Key Questions about the patterns, trends, and consequences of prescription stimulant misuse among adults in the United States; the questions and sub-questions are presented along with preliminary findings in the next section. The electronic databases PubMed and PsycINFO were searched systematically to identify relevant published research studies. The search covered 2004 through September 2024 to identify recent data and extend back to a period of increasing emergency department visits related to non-medical use (NMU) of prescription stimulants among adults (from 5,212 in 2005 to 15,585 in 2010, per the Drug Abuse



Warning Network).² Systematic reviews were screened for relevance and their references were mined. Due to the rapid timeline, studies that included only undergraduate students were excluded, unless they were published after a search previously conducted for a high quality 2020 systematic review.³ Studies reporting only academic, occupational, or physical task performance measures were excluded, as these outcomes are beyond the scope of this project.

After review of titles and abstracts resulting from the electronic searches, each full-text article/report retrieved was independently reviewed for eligibility by a literature reviewer and checked by the project leader. We maintain a record of studies excluded at the full-text level with reasons for exclusion; a literature flow diagram is included as Appendix B. One researcher abstracted data from each article/report that met inclusion criteria, and the project leader checked the data for accuracy and completeness.

For cross-sectional studies, we assessed Risk of Bias using the Joanna Briggs Institute (JBI) Checklist for Prevalence Studies,⁴ which covers sampling, data collection, reporting, and statistical analysis. For longitudinal studies, we used the Quality In Prognosis Studies (QUIPS) tool⁵ which covers study participation, attrition, prognostic factor measurement, outcome measurement, confounding, and statistical analysis.

For each study, abstracted data and key Risk of Bias items are displayed in Evidence Tables (Appendix C); pertinent data is displayed in tables and graphs and summarized narratively.

Evidence Summary

- Adult prescription stimulant misuse has declined significantly in recent years, driven by a decrease in amphetamine mixed salts misuse among young adults. The Monitoring the Future study found that past year misuse of this medication among adults ages 19 to 30 fell from 7.8 percent in 2022 to 3.7 percent in 2023, while the National Survey on Drug Use and Health found that past year prescription stimulant misuse among ages 18 to 25 declined from 7.5 percent in 2016 to 3.1 percent in 2023.
- Misuse of methylphenidate is less common than misuse of amphetamine mixed salts, which are more widely prescribed in adults. In 2023, the prevalence of past year methylphenidate misuse was 0.3 percent in all US adults and 1.2 percent among those aged 19 to 30 compared to 1.6 percent and 3.7 percent, respectively, for amphetamine mixed salts.
- Adult prescription stimulant misuse is associated with being under age 30, White, and living in metropolitan areas. Adults who misuse with high frequency (7+ days per month) have a different profile; this small subset (6.2%) is more likely than those with lower frequency to be over age 30 or not have a college degree, and they are more likely to be separated/divorced or on work disability.
- In 2022, the reasons for “most recent misuse” among adults who misused stimulants at least once in the past year were: to help concentrate (32.7%); to be alert or stay awake (28.4%); to help study (12.0%); to get high, counter the effects of other drugs or to

experiment (16.3%); and to lose weight (4.5%). Adults with prescription stimulant use disorder were significantly less likely to misuse to help study.

- Adults who misuse prescription stimulants primarily obtain them from friends/family for free (65.8%) or purchasing from them (13.0%). Those who misuse with high frequency are more likely to obtain stimulants from doctors or drug dealers.
- Most prescription stimulant misuse is oral, followed by nasal (snorting), with injection or smoking reported by a small minority; consequences varied by mode of administration.
- Over 33,000 exposures involving prescription amphetamines among persons aged 12 or older were reported to the National Poison Data System between 2012 and 2016; involvement of another substance was 46 percent for the intentional oral exposures, 65 percent for the nasal exposures, 50 percent for the intravenous exposures, compared to 22 percent for accidental oral exposures. Males were more likely to engage in nasal and intravenous administration, while oral use was similarly common among both sexes. Suicide attempts accounted for 74.1 percent of all non-accidental oral exposures.
- We identified no studies on the long-term physical health effects of prescription stimulant misuse.
- Long-term studies did not find evidence that stimulant treatment for ADHD before or at age 18 is associated with increased risk for substance use disorders in adulthood. In contrast, several studies found prescription stimulant *misuse* at age 18 to be associated with increased odds of later cocaine or methamphetamine use and substance use disorder symptoms, relative to those who at age 18 used prescription stimulants as prescribed or had never used them.
- Polysubstance use is common among adults who misuse prescription stimulants, with co-use of alcohol and marijuana especially frequent among young adults.
- In 2022, only 0.2 percent of about 1.5 million substance use treatment admissions (including both outpatient and residential modalities) that were documented in the Treatment Episode Dataset (TEDS) were for primary drug “other stimulants,” defined as “includes methylphenidate and any other prescription stimulants.” This does not include admissions for prescription amphetamines since TEDS groups these in a separate, larger category that includes certain illicit stimulants, such as MDMA, that are beyond the scope of this project.



Evidence Base

After full text review of 375 publicly available documents, 64 studies published in 71 documents met eligibility criteria. The primary reasons for exclusion were not a US study (N = 33), included no adults (N = 104), and had no data on ADHD prescription stimulants (N = 60; these often pertained to non-prescription stimulants such as cocaine or methamphetamine). A literature flow diagram is included as Appendix B.

Ten longitudinal⁶⁻¹⁵ and 54 cross-sectional¹⁶⁻⁶⁹ studies were included. Despite excluding studies of undergraduates published before a recent systematic review on the topic, almost half

of the included studies focused on university students. This report focuses on the broader adult population and features the highlights of the university studies that are most relevant to the Key Questions. Evidence Tables displaying details such as data source, setting, region, population characteristics, findings, and key Risk of Bias indicators for each study are provided as Appendix C.

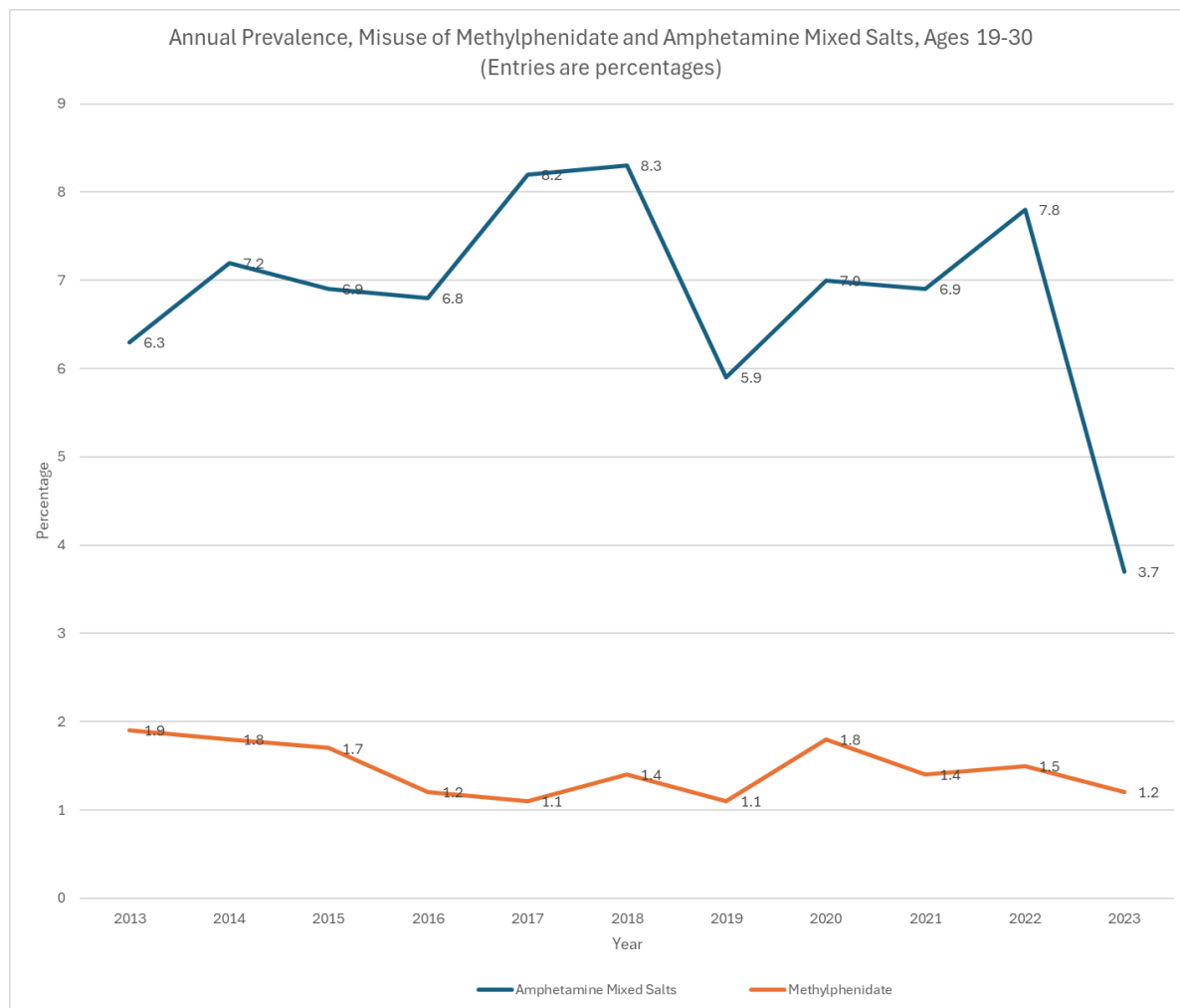
Key Question 1: What Are the Patterns and Trends in Prescription Stimulant Misuse Among Adults?

KQ1a: How Does This Vary by Patient Characteristics, Such as Age, Sex, Race, and Comorbidities? This Includes:

- **Who Misuses Prescription Stimulants, and What Are the Reasons for Misuse?**
- **Where and How Do People Acquire the Prescription Stimulants That They Are Misusing?**
- **What Is the Frequency of Misuse and How Does It Differ by Type of Stimulant, Method of Ingestion (Orally, Nasally, Injected), and Source of Diversion?**

Figure 1 displays past year misuse of amphetamine mixed salts (specifically Adderall®) and methylphenidate (Ritalin®) among US adults aged 19 to 30 years, as estimated by Monitoring the Future, a large annual survey funded by National Institute on Drug Abuse.⁴⁹ In 2023, 3.7 percent misused Adderall®, reflecting a large and statistically significant decrease from 7.8 percent in 2022 ($p < .001$) despite an increase in prescribing of amphetamine mixed salts over the last decade;²⁹ this may reflect a shortage of the immediate release formulation in the US that began in 2022.^{70, 71} Misuse of methylphenidate remained low at 1.2 percent in 2023, with no significant change in the past 10 years despite recent shortages and relatively steady prescribing levels.²⁹

Figure 1. Annual prevalence of misuse of methylphenidate and amphetamine mixed salts, ages 19–30⁴⁹

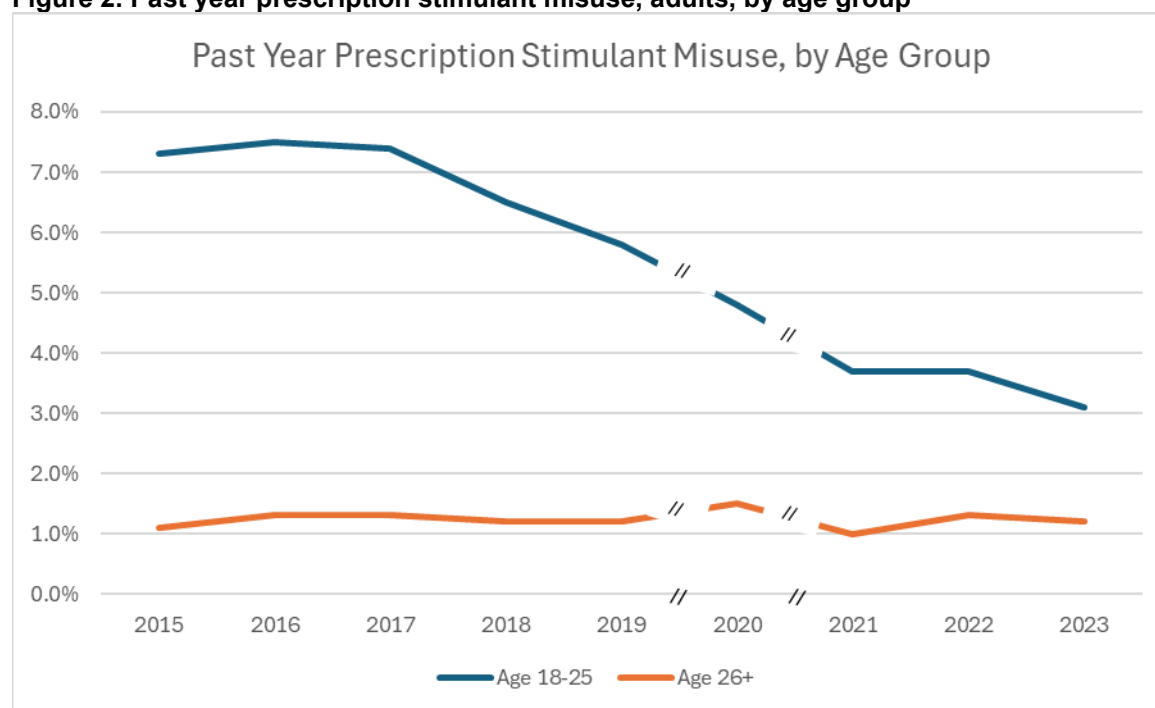


Because misuse is higher among younger than older adults, the estimated prevalence of misuse is lower in studies that include adults over age 30. The Researched Abuse, Diversion and Addiction-Related Surveillance (RADARS) System’s Survey of the Nonmedical Use of Prescription Drugs (NMURx) found national prevalence of nonmedical use of prescription stimulants among adults of all ages was 1.9 percent (95% CI 1.8%-2.0%), including amphetamine-based medications (1.6%, 95% CI 1.5%-1.6%), methylphenidate (0.3%, 95% CI 0.3%-0.4%), and modafinil (0.2%, 95% CI 0.2%-0.3%) in 2020.⁵²

Prevalence data from National Survey on Drug Use and Health (NSDUH), a nationally representative annual survey funded by the Substance Abuse and Mental Health Services Administration (SAMHSA), also reveals that prescription stimulant misuse has decreased dramatically in recent years. In 2023, an estimated 1.4 percent of Americans aged 12 and older misused prescription stimulants in the prior year, for a total of 3.9 million people. Estimated prevalence of past month misuse was 0.4 percent in 2023.⁵⁷ As shown in Figure 2 below, past

year misuse among young adults aged 18 through 25 has been steadily declining, from a high of 7.5 percent in 2016 to 5.8 percent in 2019, and from 3.7 percent in 2021 to 3.1 percent in 2023. (Due to changes in methodology, including roll-out of web-based interviews, estimates for 2021 and later are not comparable with estimates from 2019 or earlier.)

Figure 2. Past year prescription stimulant misuse, adults, by age group



Source: National Survey on Drug Use and Health^{39, 53, 55, 57}

Table 1 displays estimated past year and past month misuse in 2023 by demographic and socioeconomic characteristics. Past year misuse was highest among Whites (1.8%), adults with at least some college education, and those living in metropolitan areas (significance tests not reported).⁵⁷

Table 1. Characteristics of adults who misuse prescription stimulants, 2023: National Survey on Drug Use and Health (NSDUH), 2023⁵⁷—prescription stimulant misuse in past year and past month, percentages

Demographic Category	Demographic Characteristic	Misuse in Past Year, All Adults	Misuse in Past Month, All Adults	Misuse in Past Year, Age 18-25	Misuse in Past Month, Age 18-25	Misuse in Past Year, Age 26+	Misuse in Past Month, Age 26+
TOTAL	All	1.4	0.4	3.1	0.9	1.2	0.4
SEX	Male	1.5	0.5	3.0	0.9	1.3	0.4
	Female	1.4	0.4	3.3	0.9	1.1	0.3

Demographic Category	Demographic Characteristic	Misuse in Past Year, All Adults	Misuse in Past Month, All Adults	Misuse in Past Year, Age 18-25	Misuse in Past Month, Age 18-25	Misuse in Past Year, Age 26+	Misuse in Past Month, Age 26+
HISPANIC ORIGIN AND RACE	Alaskan Native/ Native American	1.1	*	1.0	*	1.1	*
	Asian	0.8	0.2	1.6	0.7	0.7	0.1
	Black or African American	0.8	0.2	1.6	0.7	0.7	0.2
	Native Hawaiian / Pacific Islander	0.5	*	*	*	*	*
	White	1.8	0.5	4.4	1.2	1.5	0.4
	Two or More Races	1.4	0.7	1.2	0.2	1.5	0.8
	Hispanic or Latino	0.9	0.3	2.1	0.5	0.6	0.3
EDUCATION LEVEL	< High School	0.8	0.3	1.6	0.5	0.5	0.3
	High School Graduate	1.0	0.3	1.8	0.3	0.8	0.3
	Some College/Associate's Degree	1.7	0.6	4.0	1.5	1.2	0.4
	College Graduate	1.8	0.5	4.7	0.8	1.5	0.4
EMPLOYMENT STATUS	Full-Time	1.8	0.5	3.1	0.7	1.6	0.5
	Part-Time	1.8	0.6	3.7	1.5	1.1	0.3
	Unemployed	2.0	0.5	2.9	0.6	1.6	0.4
	Other	0.8	0.3	2.6	0.8	0.6	0.2
GEOGRAPHIC REGION	Northeast	1.5	0.5	3.0	1.0	1.3	0.5
	Midwest	1.6	0.5	3.5	1.2	1.3	0.4
	South	1.4	0.4	2.9	0.9	1.1	0.3
	West	1.3	0.3	3.2	0.7	1.0	0.3
COUNTY TYPE	Large Metro	1.5	0.4	3.2	0.9	1.2	0.4
	Small Metro	1.5	0.5	3.5	1.0	1.2	0.4
	Nonmetro	1.0	0.3	1.9	0.4	0.9	0.3
	Urbanized	0.9	0.3	2.3	0.8	0.7	0.2
	Less Urbanized	1.1	0.4	1.3	0.1	1.1	0.4
	Completely Rural	0.8	*	3.6	*	0.4	*
POVERTY LEVEL	Less than 100%	1.4	0.5	3.1	1.2	0.9	0.3
	100-199%	1.3	0.3	3.4	0.8	0.8	0.2
	200% or More	1.5	0.5	3.0	0.8	1.3	0.4
	Private	1.5	0.4	3.9	1.1	1.1	0.4

Demographic Category	Demographic Characteristic	Misuse in Past Year, All Adults	Misuse in Past Month, All Adults	Misuse in Past Year, Age 18-25	Misuse in Past Month, Age 18-25	Misuse in Past Year, Age 26+	Misuse in Past Month, Age 26+
HEALTH INSURANCE	Medicaid/CHIP	1.7	0.7	2.2	0.6	1.6	0.7
	Other	0.5	0.2	3.5	1.3	0.4	0.1
	No Coverage	1.6	0.4	2.2	0.6	1.5	0.3

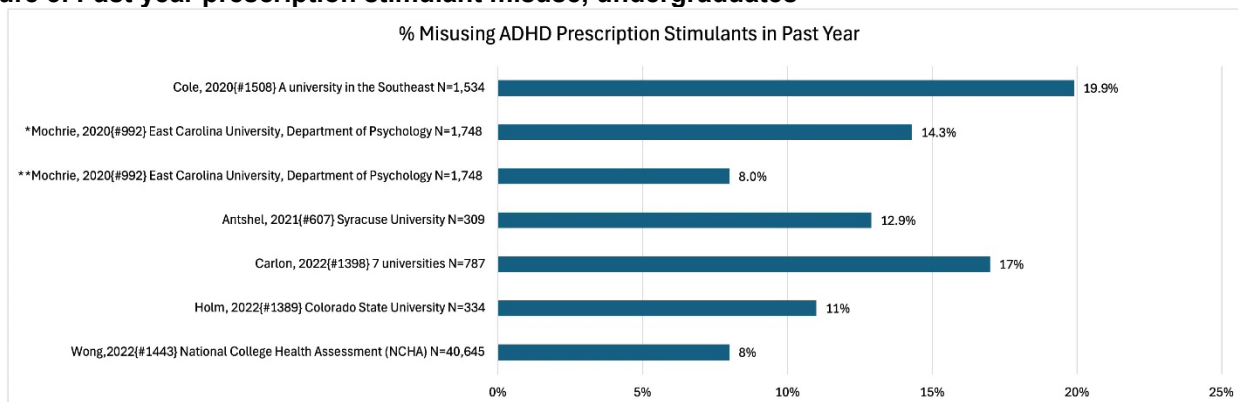
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Multivariate regression analysis of data from the 2015-2019 National Surveys on Drug Use and Health³⁹ found that men had a 1.37 times higher odds of misuse in the past year ($p < .001$), while no sex difference was observed in the prevalence of prescription stimulant-use disorder (approximately 0.2% for both). The authors found no significant interaction of misuse with sexual orientation; however, another analysis of NSDUH data⁵¹ found that lesbian, gay, and bisexual individuals had uniformly higher stimulant use than their heterosexual peers ($p < .001$). An in-depth 2018 analysis of NSDUH data²⁴ categorized high frequency misuse as at least seven days per month; those with high frequency misuse were less likely than those with lower frequency misuse to be under age 30, non-White, or have a college degree (all $p < .05$), and they were more likely to be separated/divorced or on work disability (all $p < .05$).

The following reasons for “most recent misuse” among adults who misused prescription stimulants at least once in the prior year were identified by the 2023 NSDUH: to help concentrate (36.1%); to be alert or stay awake (29.3%); to help study (11.0%); to get high, counter the effects of other drugs, or to experiment (16.1%); and for weight loss (3.9%).⁵⁷ In contrast, a similar analysis of the 2022 NSDUH²⁹ reported the following reasons for adults with prescription stimulant use disorder: to help concentrate (34.0%); to be alert or stay awake (33.6%); to help study (5.5%); to get high, counter the effects of other drugs, or to experiment (16.0%); for weight loss (3.7%) and for other reasons (7.2%).

As noted above, the prevalence of prescription stimulant misuse is higher among college-age individuals than in the general adult population. Figure 3 compares the percent of students self-reporting past year misuse in six studies of university undergraduates,^{16, 20, 23, 30, 43, 69} with prevalence ranging from 8.0 percent at East Carolina University in academic year 2019-2020 to 19.9 percent at an unnamed university in the Southeast reported in a study published in 2020 (year of data collection not reported).²³ The risk of bias of these studies varied; some that were conducted at single universities had high risk due to convenience sampling, resulting in participant demographics that were not representative of that university’s population. A more robust study, the National College Health Assessment, reported that 8 percent of US undergraduates misused prescription stimulants at least once in 2017.⁶⁹

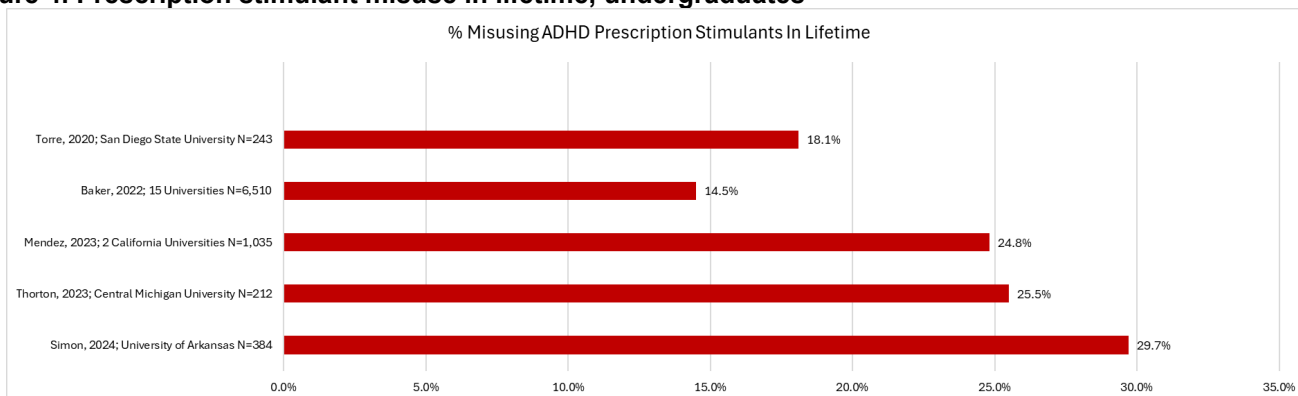
Figure 3. Past year prescription stimulant misuse, undergraduates



Notes: *Diagnosed with ADHD, ** Not diagnosed with ADHD

As displayed in Figure 4, five recent studies asked undergraduates if they misused at least once in their lifetime;^{17, 33, 41, 56, 61} prevalence ranged from 14.5 percent at 15 unnamed US universities to 29.7 percent at the University of Arkansas. Again, studies conducted at single universities often had unclear or high risk of bias due to convenience sampling.

Figure 4. Prescription stimulant misuse in lifetime, undergraduates



Four health-oriented graduate schools (medicine, dentistry, and podiatry) asked students whether they ever misused prescription stimulants while attending;^{40, 42, 63, 66} “yes” response rates ranged from 10 percent reported in a study conducted at University of Kentucky Medical School published in 2010 to 32 percent in a study conducted in 2016 at New York College of Podiatry Medicine.⁴² This may reflect the higher prevalence of misuse in the US in 2016 and the higher prevalence in urban areas like New York City.

Five university studies found prescription stimulant misuse significantly associated with white race/ethnicity^{6, 23, 30, 63, 69} in multivariate analyses; no university studies found a significant association of any other race/ethnicity with misuse. Results for sex were mixed, with five studies reporting that misuse was significantly associated with male sex,^{8, 16, 23, 33, 69} while two studies found that misuse was significantly associated with being female.^{6, 30} The NCHA also found that

prescription stimulant misuse was significantly associated with past-year diagnosis or treatment of depression (adjusted odds ratio [AOR] 1.16, CI 1.01 -1.33), anorexia (AOR 1.44, CI 1.02 - 2.03), attention-deficit/hyperactivity disorder (AOR 1.66; CI 1.41 - 1.95), and substance use disorder/other addiction (AOR 1.79, CI 1.30 - 2.46).⁶⁹

Three university studies collected data on specific prescription stimulants. One study of seven universities in Georgia found Adderall® the most commonly misused prescription stimulant, accounting for 42.9 percent of past year misuse, followed by lisdexamfetamine (Vyvanse®, 27.4%) and then methylphenidate (13.2%).⁸ Studies at Texas State University, San Marcos¹³ and a dental school in Texas⁴⁰ also found that Adderall® was much more commonly misused than Ritalin or other prescription stimulants.

Adults who misused in the past month did so on an average of 4.5 days, while 4.3 percent misused 20 or more days (2023 NSDUH).⁵⁷ A recent publication on the 2022 NSDUH²⁹ provided more nuance on frequency of use, as follows: misused past year but not past month 68.2 percent; 1-2 days past month 14.3 percent; 3-5 days past month 8.2 percent; and 6 or more days past month 9.3 percent. Of note, a study of 180 parents attending an educational presentation on living with children with ADHD found that 16 percent took their child's medication at least once. The reported lifetime frequency of misusing their child's medication in this small subset was: 1-3 times 75 percent, 4 -10 times 25 percent, and no parents took the medication over 10 times.⁵⁰ The seminar took place in suburban New York City and may not reflect national patterns. Unfortunately, we found no studies reported frequency of use by route of administration.

Table 2 displays frequency among university students who misuse prescription stimulants. Misuse was occasional for most; for example, among psychology students at Syracuse University who misused, 76 percent did so three or fewer times per year.¹⁶ A survey conducted at 15 universities found that of those who misused to study, 70 percent did so during finals or exams, 51 percent before a test or project, 47 percent when they felt behind, 20 percent when they wanted to get ahead, 5 percent when they needed a competitive edge, and 10 percent used continuously throughout the term.¹⁷ Two university studies asked about specific medications;^{30, 42} both found that Adderall® was misused at a higher frequency than Ritalin®. Thirty-seven students who misused prescription stimulants at Texas State University San Marcos tracked their misuse for a month; on days that prescription stimulant misuse occurred, 88.8 percent of those days had one episode of misuse, 10.8 percent two episodes, and 0.4 percent three episodes.¹³ Many university studies had high or unclear risk of bias due to either low response rates, convenience sampling, or no report of whether the sample adequately represented the university population.

Table 2. Frequency of misuse among university students who misuse prescription stimulants

Study	Data Source	Sample Size	Year Data Collected	Frequency of Misuse	Risk of Bias
Antshel, 2021 ¹⁶	Syracuse University	309	10/2015-10/2016	Three or fewer times per year 76.3%, two or fewer times per month 21.0%.	Administered in Introductory Psychology class; not

Study	Data Source	Sample Size	Year Data Collected	Frequency of Misuse	Risk of Bias
					representative of entire university
Baker, 2022 ¹⁷	15 universities	6510	Spring 2022	In the past 12 months: 1-9 times 43%, 10-19 times 7%, 20-49 times 4%, 50 or more times 2%. Of those who misused to study, 70% misused during finals or exams, 51% before a test or project, 47% when they fell behind, 20% when they wanted to get ahead, 5% when they needed a competitive edge, and 10% used continuously throughout the term.	11.2% response, no description of how managed or comparison of demographics with entire student population
Dwyer, 2022 ²⁵	Eastern Michigan University, Rowan University	116	9/2017 to 5/2018	Past year: 1–2 times 31.9%, 3–5 times 13.0%, 6+times 13.0.	White students overrepresented
Holm, 2022 ³⁰	Colorado State University	334	Not reported	Mean days used in past month: Adderall® 2.80 (5.90), Ritalin® 0.63 (2.76), Vyvanse® 3.43 (8.91).	University psych research pool, no comparison with larger student population
Ilieva, 2019 ³⁴	universities in Philadelphia	128	NR	Lifetime misuse: Never 52.3%, 1 occasion 3.9%, 2 occasions 1.6%, 3-5 occasions 14.1% , 6-9 occasions 6.3% , 10-19 occasions 11.7%, 20-39 occasions 7.0%, 40 or more occasions 3.1%.	Unclear if participants were representative of entire population
McNiel, 2011 ⁴⁰	dental schools in Texas	243	2008	2-3 times per year: 83%, 1-2 times per month: 13%, 1-2 times per day: 4%	Inadequate statistical power - 74% response needed; rate was 61%; no comparison of respondents with entire student population

Study	Data Source	Sample Size	Year Data Collected	Frequency of Misuse	Risk of Bias
Mendez, 2023 ⁴¹	2 California Universities	1,035	2013 and 2016	Of those who misused in lifetime: never during college 16.73%, 1–2 times 30.35%, 3–5 times 18.29%, 6–9 times 8.56%, 10–19 times 3.11%, 20–39 times 1.95%, 40 or more times 2.72%. The internet as a source was associated with greater misuse frequency for students identifying as White (p 0.01) and Asian (p 0.01). Identifying 'self' as a source was associated with increased frequency only for students identifying as White (p<0.01).	Low risk of bias - randomly selected classes, 92.6% response
Mineo, 2017 ⁴²	New York College of Podiatry Medicine	303	2/2016 - 7/2016	Adderall® /AdderallXR®, times used in past year: 1–2 times 6%, 3–5 times 7.3%, 6–9 times 2.5%, 10–19 times 4.2%, 20–39 times 2.2%, ≥40 times 1.6%. Ritalin® /Concerta®: 1–2 times 3.9%	Low risk of bias - administered to ALL students, 86.5% response
Schepis, 2021 ¹³	Texas State University, San Marcos	37	Not reported	On days that prescription stimulant misuse occurred, 88.8% of days had one prescription stimulant misuse episode, 10.8% two and 0.4% three.	Convenience sample - recruited via flyers
Tuttle, 2010 ⁶³	University of Kentucky Medical School	388	Not reported	Of those with a lifetime history: 5 or more times 39%, 2-5 times 45%, only once 15%; 48% of those with lifetime history of misuse reported such use during medical school.	Low Risk of Bias, every student contacted, 84% response

The ways by which prescription stimulants are acquired differ by frequency of misuse. An analysis of 2016 NSDUH data²⁴ found adults who misuse with high frequency (7+ days in the past month) were less likely than those who misuse less than monthly to obtain stimulants from their friends/relatives for free (44.9% vs 58.8%) and were more likely to obtain them from one or more doctors (25.2% vs 10.1%) or from drug dealers/strangers (9.2% vs 4.0%). According to 2022 NSDUH data, those with prescription stimulant use disorder (SUD) were less likely to obtain stimulants from friends/relatives for free (23.4%) and more likely to obtain from doctors (38.5%) than those without the SUD diagnosis.²⁹

The only nationally representative source of data on internet acquisition, a 2005 Harris Poll of Americans aged 18 to 49, found adults who misused prescription stimulants in the past year acquired them in the following ways (not mutually exclusive): given by friend/ family member (65.8%), purchased from friend/family (13.0%), stolen (including stolen from friend/family member, 34.5%), obtained fraudulently from a doctor (19.8%), or from an internet pharmacy (5.3%).⁴⁶

Prescription stimulants are primarily misused orally. According to a 2010 national YouGov® internet survey,²¹ route of administration (not mutually exclusive) was primarily oral (94.7% for Concerta®, 80.7% for Ritalin®), followed by snorting (Ritalin®, 39.6%), and injecting or smoking (6% or less). More recently, researchers conducted outreach specifically to adults who misuse these medications intranasally (N = 225) via Reddit.⁶⁵ A large proportion of the adults who misuse intranasally also misused the stimulants orally (85%), and some injected (6%) or smoked (4%) prescription stimulants. This study asked participants to indicate all their sources of medication: 72.1 percent purchased the medication from a family member or friend, 64.5 percent were given by a family member or a friend, 10.5 percent stole it from a family member or friend, 39.6 percent bought it from dealers, 24.4 percent had a prescription from a physician, and 5.3 percent bought it online without having seen a doctor. This study has unclear risk of bias, as the sample size was small, only 13.8 percent of respondents were female, and only 10.9 percent were age 35 or older. Thus, responses may not reflect national trends.

Key Question 2: What Are the Shorter Term (e.g., Overdose) And Longer Term (e.g., Cardiovascular) Health Consequences of Prescription Stimulant Misuse Among Adults?

KQ2a: How Do These Consequences Vary Based on Type of Stimulant and Patient Characteristics?

Analysis of data from the U.S. National Poison Data System from January 2012 to December 2016 described the medical and health consequences of exposures to prescription stimulants containing amphetamines;²⁶ these were substantial across all modes of administration. During those five years, 33,239 exposures involving prescription amphetamines among persons aged 12 or older were reported to US poison control centers; 15,876 had data available for analyses (9,713 with available data were adults). The mean age of adults was 31.5 years (SD = 11.03). The prevalence of another substance was 46 percent for oral intentional misuse, 65 percent for nasal, 50 percent for intravenous (IV) use, and 22 percent for to controls defined as unintentional oral exposures ($p < .000$). Compared to these controls (7.9%), IV (36.6%), nasal (21.2%), and oral administration (24.6%) were significantly associated with higher rates of admission to critical care units ($p < .0001$); this may reflect the significantly lower prevalence of other substances among control exposures. Oral administration had the highest likelihood (OR = 7.48) of admission to psychiatric care facilities, followed by nasal (OR = 3.22) and IV (OR = 3.11), compared to controls ($p < .0001$). The high rate of psychiatric admission among oral exposures is likely because suspected suicide attempts were significantly more common among oral (74.1%) compared to IV (20.7%), and nasal (15.6%) routes, with a modest but significant increase in risk over time ($p < .0001$). All groups exhibited a higher prevalence of adverse clinical effects compared to controls, with IV exposure having the most severe outcomes, including a 21.9-fold increased risk of mortality compared to controls. Males were more likely to engage in nasal and IV administration ($p < .0001$), whereas oral use was similar among both sexes.

According to the 2022 Treatment Episode Data Set (TEDS), only 0.2 percent (N = 2,543) of about 1.5 million substance use treatment admissions documented (including both outpatient and residential modalities) were for primary drug “other stimulants,” defined as “includes methylphenidate and any other prescription stimulants.”⁵⁸ (The TEDS category “amphetamines” includes MDMA and other drugs which are beyond the scope of this project.) The annual number has remained relatively steady since 2018. TEDS provides data specific to Ritalin®; there were 78 drug treatment admission for this medication in 2022, representing the primary drug for 31, secondary drug for 31, and tertiary drug for 16 admissions. Admissions specific to Adderall® or other brand names for prescription stimulants were not reported.

We found no long-term studies reporting the physical health consequences of prescription stimulant misuse.

KQ3: What Is the Role of Appropriate Use or Misuse of Prescription Stimulants on the Use of Illicit Stimulants and Other Substances?

According to an analysis of longitudinal data from Monitoring the Future, individuals who at age 18 simultaneously used prescription stimulants for both nonmedical and medical purposes ($p = .01$), and those who used them for only nonmedical use ($p = .001$) were more likely to have at least two Substance Use Disorder (SUD) symptoms at age 35, compared to those with no use of stimulant medications or only medical use at age 18.¹¹ Multivariate regression analysis by the same researchers¹² yielded no significant association of prescribed stimulant therapy for ADHD at age 18 with past year cocaine use during young adulthood; moreover, adolescents who reported prescription stimulant misuse (and who had no history of stimulant therapy for ADHD) had the highest adjusted odds of later cocaine (OR 2.59, CI 1.51 - 4.46) and methamphetamine (OR 4.66, CI 0.91 - 23.71) use at 19 to 24 years of age compared with population controls who reported no lifetime use of stimulants at age 18.¹⁰ Another analysis of 8,362 Monitoring the Future participants followed for 15 years found no evidence for an association of childhood treatment with stimulant medication with adolescent or young adulthood substance use disorder (OR 1.18, CI 0.93 - 1.50).¹¹ These findings together suggest stimulant treatment for ADHD before or at age 18 does not increase the risk of prescription stimulant misuse, use of illicit stimulants, or substance use disorders in young adulthood. Conversely, the studies support an association between misuse of stimulants at age 18 with future use of illicit stimulants and SUD.

National cross-sectional studies reported that many adults who misuse prescription stimulants engage in polysubstance use. A 2005 Harris Poll found that adults who misuse stimulant medication used the following substances “at the same time or within a couple hours” in the past year: alcohol 52.8 percent, marijuana 26.2 percent, cocaine 19.8 percent, heroin 6.4 percent, other prescription medications 19.5 percent, hallucinogens 3.6 percent, or any substance 67.9 percent.⁴⁶ A 2018 analysis of NSDUH data found adults who misuse prescription stimulants at high frequency (7+ days past-month) had high rates of past-year cocaine use disorder (10.9%), past year heroin use or heroin use disorder (14.3%), past-year inhalant use or inhalant use disorder (11.4%), prescription tranquilizer/sedative disorders (9.8%), and prescription opioid misuse disorders (10.1%)²⁴ The 2023 NSDUH survey estimated that 786,000 Americans aged

12 and over misused both cocaine and prescription stimulants, 190,000 misused both methamphetamine and prescription stimulants, and another 182,000 misused all three drugs.⁵⁷ It is important to note that these cross-sectional studies did not report the age at which each substance was first used, so it is not possible to determine whether use of one substance predated another.

As shown in Table 3, the misuse of prescription stimulants among university students is associated with alcohol, tobacco, and marijuana use. Reported prevalence levels and measurement varied by university, and most studies had high or unknown risk of bias due to convenience sampling or low response rate. The most recent nationally representative study of college students⁶⁹ reported that the odds of prescription stimulant misuse were 5.5 times higher (CI 4.54–6.71) for students reporting a past-month use of “legal drugs” (cigarettes, alcohol, marijuana) and 8.0 times higher (CI 6.96–9.15) for students reporting a past month use of “illegal drugs” (cocaine, sedatives, hallucinogens, opiates, methamphetamine). The odds ratios for specific substances were not reported.

Table 3. Polysubstance use among university students who misuse prescription stimulants

Study	Data Source	Sample Size	Year Data Collected	Polysubstance Use	Risk of Bias
Antshel, 2021 ¹⁶	Syracuse University	309	10/2015-10/2016	Higher alcohol and cannabis use were associated with misuse.	Administered in Introductory Psychology class; not representative of entire university
Baker, 2022 ¹⁷	15 universities	6510	Spring 2022	Misuse with alcohol: very often 1%, often 7%, sometimes 15%.	11.2% response, no description of how managed or comparison of demographics with entire student population
Cole, 2020 ²³	A university in the Southeast	1534	Not reported	Students who misuse prescription stimulants were more likely than nonusers to use tobacco (p .001), marijuana (p .001), and binge drink (p .001), but less likely than those who used both stimulants and other hard drugs (p .001, p .001, p .001).	Unclear risk of bias, inadequate methods info
Fairman, 2021 ⁸	7 universities in Georgia	2927	2014 - 2016	Use among students with prescription stimulant misuse, past 30 days: Alcohol 94.0%, Marijuana 60.0%, Tobacco 68.0%.	No comparison of respondent demographics with entire student population
Mineo, 2017 ⁴²	New York College of Podiatry Medicine	303	2/2016 - 7/2016	Students who used illicit drugs while enrolled had 2.3 higher odds of misuse of stimulants.	Low risk of bias - administered to ALL students, 86.5% response

Study	Data Source	Sample Size	Year Data Collected	Polysubstance Use	Risk of Bias
Holt, 2023 ³¹	7 universities in 6 states: Colorado, New Mexico, New York, Virginia, Texas, and Wyoming	538	fall 2019 - spring 2020	Among students with stimulant misuse: Mean days past month marijuana use 11.71 (11.90), mean days past month alcohol use 7.35 (6.50). As compared to the reference group (Given by Friend), those who misused their own prescription medication had lower prevalence of past 30-day marijuana use (p .028), simultaneous alcohol-marijuana use (p .011), rate of negative consequences (p .042) and lower odds of non-oral stimulant misuse (OR = 0.29, 95% CI = 0.14–0.58). The Peer/Dealer class had a higher count of consequences than the Given by Friend class (p .001).	No comparison of respondents with larger population, only reflects psych students
Simon, 2024 ³⁶	University of Arkansas	384	Not reported	In a logistic regression analysis, stimulant NMU was significantly associated with: Harmful alcohol use OR 3.62 (CI 1.86, 7.05), Marijuana use 7.66 (4.50, 13.05), Other prescription drug misuse 22.65 (11.47, 44.74), Illicit drug use 17.91 (9.48, 33.85), and Nicotine products 4.48 (2.67, 7.51).	Authors note “Demographics were fairly consistent with overall University student characteristics” but 49.5% of respondents were White, compared to 70% of university students total
Thorton, 2023 ⁶¹	Central Michigan University	212	9/2014 to 5/2015	17.9% have used prescription stimulants with alcohol.	Convenience sample - posted online, only interested parties responded, so no response rate. No comparison of demographics with full population.
Wong, 2022 ⁶⁹	National College Health Assessment (NCHA)	40645	2017	The odds of prescription stimulant misuse were 5.5 times higher (CI 4.54–6.71) for students reporting past-month use of “Legal drugs” (cigarettes, alcohol, marijuana) and 8.0 times higher (CI 6.96–9.15) for students reporting past month use of “Illegal drugs” (cocaine, sedatives, hallucinogens, opiates, methamphetamine).	Low risk of bias, nationally representative

Notes: CI 95% confidence interval, OR odds ratio

As noted in the findings for Key Question 2, polysubstance use has also been documented in overdose data. Of all Rhode Island accidental fatal overdoses between May 1, 2017 and May 31, 2020 in which prescription amphetamines or methylphenidate were deemed to contribute to the cause of death ($N = 39$), 90 percent involved opioids, 33 percent cocaine, and 18 percent benzodiazepines.³⁸

Conclusions

Adult prescription stimulant misuse has declined significantly in recent years, driven by a reduction in misuse of amphetamine-based medications among young adults. Methylphenidate misuse has been consistently lower than misuse of amphetamine mixed salts over the past ten years. Still, in 2023, an estimated 786,000 Americans aged 12 and over misused both cocaine and prescription stimulants; 190,000 misused both methamphetamine and prescription stimulants; and another 182,000 misused all three drugs.⁵⁷

Past year prescription stimulant misuse was associated with being younger, White, and living in metropolitan areas. Adults who misuse with high frequency had a different profile than others. This subset of adults with high frequency misuse were significantly *more* likely to be over age 30 or not have a college degree and *more* likely to be separated/divorced or on work disability. Common reasons for misuse include to help concentration, to be alert or stay awake, to help study, to lose weight, and to get high/party. Persons with prescription stimulant use disorder were more likely to misuse these medications for a reason related to substance use (because they were “hooked”, wanted to get high, to counter the effects of other drugs, or to experiment) or to lose weight. Adults who misuse prescription stimulants primarily obtain them from friends or family; those with high-frequency misuse are more likely than others to misuse other substances and to obtain stimulants from doctors or drug dealers.

Most prescription stimulant misuse is oral, followed by nasal (snorting), with injection or smoking reported in a small minority. An analysis of exposures from the National Poison Data System indicated that males were more likely to engage in nasal and intravenous administration, while oral use was similarly common among both sexes.²⁶ Suicide attempts accounted for 74.1 percent of all overdose episodes involving non-accidental oral administration; FDA labeling recommends clinicians who prescribe stimulant medications take a detailed psychiatric history.

Long-term studies identified in this Rapid Review provided evidence that stimulant treatment for ADHD at or before age 18 likely does not increase risk for substance use disorders in adulthood. In contrast, prescription stimulant misuse at age 18 increased odds of later cocaine or methamphetamine use, relative to those who at age 18 used prescription stimulants as directed or had never used them.

This Rapid Review has several important limitations. Similar to a 2020 systematic review on the topic,³ we found studies conducted at individual colleges and universities reported a wide range of misuse prevalence; sometimes participant characteristics did not reflect the university population or response rates were low, so those studies may not reflect national patterns.

Nevertheless, high quality evidence for prevalence of misuse is available from large national studies conducted annually using assessment instruments that have high reliability and validity.

Our search of literature published in the last 20 years identified no studies on the long-term health effects of prescription stimulant misuse, including neurological or cardiovascular problems. This Rapid Review was limited to studies conducted in the US; inclusion of studies conducted in other regions could potentially find relevant data. That no US research on this topic has been published recently is concerning, given the extent of prescription stimulant misuse. The absence of research on the long-term effects of prescription stimulant misuse, especially among those who misuse with high frequency, is an important research gap.

A study of patients at McLean Hospital⁷² published after our literature search found patients admitted for psychosis or mania were more likely than patients admitted for other psychiatric symptoms/ disorders to report misuse of nonprescribed stimulants ($p=0.007$). Further analysis of existing federal datasets could provide additional insights into these and other consequences of prescription stimulant misuse among adults. For instance, the Drug Abuse Warning Network (DAWN), a national database tracking drug-related emergency department visits, includes data on prescription stimulants. However, this information was not presented in recent DAWN reports, as prescription stimulants are not among the ten most common substances involved in ED visits.⁷³ We also found no data on frequency of use by route of administration.

Finally, prior analyses specific to adults with prescription stimulant use disorder and / or high frequency use could be repeated using 2023 NSDUH data to investigate whether findings are generalizable to the current context.

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Peer Reviewers

Prior to publication of the final evidence report, EPCs seek input from independent Peer Reviewers without financial conflicts of interest. However, the conclusions and synthesis of the scientific literature presented in this report do not necessarily represent the views of individual reviewers. AHRQ may also seek comments from other federal agencies when appropriate.

Peer Reviewers must disclose any financial conflicts of interest greater than \$5,000 and any other relevant business or professional conflicts of interest. Because of their unique clinical or content expertise, individuals with potential nonfinancial conflicts may be retained. The TOO and the EPC work to balance, manage, or mitigate any potential nonfinancial conflicts of interest identified.

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The information in this report is intended to help health care decision makers—patients and clinicians, health system leaders, and policymakers, among others—make well-informed decisions and thereby improve the quality of health care services. This report is not intended to be a substitute for the application of clinical judgment. Anyone who makes decisions concerning the provision of clinical care should consider this report in the same way as any medical reference and in conjunction with all other pertinent information, i.e., in the context of available resources and circumstances presented by individual patients.

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Afterword

Recognized for excellence in conducting comprehensive systematic reviews, the Agency for Healthcare Research and Quality (AHRQ) Evidence-based Practice Center (EPC) program is developing a range of rapid evidence products to assist end-users in making specific decisions in a limited timeframe.

The AHRQ EPC Program recognizes that people are struggling with urgent questions. To shorten timelines, reviewers make strategic choices about which review processes to abridge. However, the adaptations made for expediency may limit the certainty and generalizability of the findings from the review, particularly in areas with a large literature base. Transparent reporting of the methods and the resulting limitations of the evidence synthesis are extremely important.

Given the rapidly evolving field, the AHRQ EPC Program will update these reviews on a regular basis to keep the medical community and public up to date as more studies are published. If you have comments or have unpublished data to share related to this report, they may be sent by mail to the Task Order Officer named below at: Agency for Healthcare Research and Quality, 5600 Fishers Lane, Rockville, MD 20857, or by email to epc@ahrq.hhs.gov and will be considered in the next version of the report.

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Appendixes

Appendix A. Methodological Details

Key Questions

KQ1: What are the patterns and trends in prescription stimulant misuse among adults?

KQ1a: How does this vary by patient characteristics, such as age, sex, race, and comorbidities? This includes:

- Who misuses prescription stimulants, and what are the reasons for misuse?
- Where and how do people acquire the prescription stimulants that they are misusing?
- What is the frequency of misuse and how do they differ by type of stimulant, method of ingestion (orally, nasally, injected), and source of diversion?

KQ2: What are the shorter term (e.g., overdose) and longer term (e.g., cardiovascular) health consequences of prescription stimulant misuse among adults?

KQ2a: How do these consequences vary based on type of stimulant and patient characteristics?

KQ3: What is the role of appropriate use or misuse of prescription stimulants on the use of illicit stimulants and other substances?

Criteria for Inclusion/Exclusion of Studies in the Review

The inclusion and exclusion criteria for studies are listed below.

Table A-1. Eligibility Criteria

Domain	Inclusion Criteria	Exclusion Criteria
Population	Adults (defined as 18 and older) experiencing misuse of stimulants (1) with a diagnosis treated with a prescription stimulant medication or (2) who do not have an ADHD diagnosis	Children under age 18; adults using ADHD medications as prescribed; studies of undergraduate students unless they were published after the 2020 systematic review ³ or provide qualitative data
Exposure	Taking a stimulant medication such as methylphenidate (e.g., Ritalin®) and amphetamine compounds (e.g., dextroamphetamine; Adderall®) or other prescription stimulants (1) in any way other than directed by a prescriber or (2) without a prescription	No prior or current stimulant misuse
Comparators	N/A	N/A
Outcomes	Morbidity and mortality, psychological outcomes, employment outcomes	Academic performance, specific occupational or physical task performance
Timing	2004 to present	Published before 2004
Study Design	Randomized control trials, non-randomized controlled trials, observational studies, case-control	Meta-analysis, case reports
Setting	United States	Non-U.S.
Other Limiters	English language	All except English

Searching for the Evidence: Strategies for Identification of Relevant Studies

The electronic databases PubMed and PsycINFO were searched systematically to identify published research studies. The search covered 2004 through September 2024 to coincide with recent data and extend back to a period of increasing emergency department visits involving NMU of prescription stimulants. (emergency department visits related to NMU of these drugs by adults increased from 5,212 in 2005 to 15,585 in 2010 per the Drug Abuse Warning Network).² Identified systematic reviews were screened for relevancy and references mined. The criteria listed in Table A.1 determined eligibility for inclusion and exclusion of publications in accordance with the AHRQ Methods Guide for Effectiveness and Comparative Effectiveness Reviews. To reduce reviewer errors and bias, all citations and abstracts were reviewed by the project leader.

Each full-text document was independently reviewed for eligibility by two literature reviewers. We maintained a record of studies excluded at the full-text level with reasons for exclusion. Documents reporting on the same study were consolidated into one study record (researchers may publish varied analyses of a data set in separate journal articles or reports.).

Initial Pubmed search strategy is below.

```
((prescription stimulant misuse[Title/Abstract])
OR
((prescription AND stimulant[title/abstract]) AND (("Prescription Drug Misuse"[Mesh] OR
"Drug Misuse"[Mesh] OR "Prescription Drug Diversion"[Mesh] OR "Substance Abuse,
Oral"[Mesh]) OR (misuse[Title/Abstract] OR misusing[Title/Abstract] OR abuse[Title/Abstract]
OR diversion[Title/Abstract] OR illicit use[Title/Abstract] OR stimulant
misuse[Title/Abstract]))) AND
(Humans[MESH]))
NOT
(Editorial[ptyp] OR Letter[pt] OR Case Reports[pt] OR Comment[pt] address[pt] OR
"autobiography"[pt] OR "bibliography"[pt] OR "biography"[pt] OR "case report"[tw] OR "case
reports"[tw] OR "case series"[tw] OR "comment on"[All Fields] OR congress[pt] OR
"dictionary"[pt] OR "directory"[pt] OR "festschrift"[pt] OR "historical article"[pt] OR
lecture[pt] OR "legal case"[pt] OR "legislation"[pt] OR "news"[pt] OR "newspaper article"[pt]
OR "patient education handout"[pt] OR "periodical index"[pt])
```

Data Abstraction and Data Management

A data abstraction form was created in DistillerSR, an online program for systematic reviews. Forms include detailed guidance to support reviewers to aid both reproducibility and standardization of data collection. After a formal training by the project leader, researchers individually abstracted data, and the project leader checked for accuracy and completeness. Forms were pilot tested with a sample of included articles to ensure that all relevant data elements were captured, and that ambiguity was avoided. The group met weekly to discuss concerns, with meetings held in the interim when needed.

The following data was abstracted:

- Study identifier (author) and publication year
- Study type
 - ▶ Longitudinal
 - ▶ Cross-sectional
- Region
- Population (not mutually exclusive)
 - ▶ Mean (SD), minimum, and maximum age
 - ▶ Racial/ethnic composition
 - ▶ % Female
 - ▶ Diagnosed with ADHD
 - ▶ Psychiatric co-morbidities
 - ▶ Other, specify _____
- Data source / setting
 - ▶ College / university
 - ▶ Healthcare data (Emergency Dept, Poison Control, Death Certif, etc.)
 - ▶ National survey / database
 - ▶ Community
 - ▶ Other
- Reason for misuse
 - ▶ Enhance academic or work performance
 - ▶ Weight loss
 - ▶ Recreational (“party”)
 - ▶ Other, specify _____
- Source of stimulant
 - ▶ Individual’s own prescription
 - ▶ Malingering
 - ▶ Doctor shopping
 - ▶ Friend
 - ▶ Family member
 - ▶ Stranger / dealer
 - ▶ Other, specify _____
- Route of administration
 - ▶ Oral
 - ▶ Nasal
 - ▶ Smoked
 - ▶ Injection
- Exposure
 - ▶ Specific prescription stimulant(s), if named
- Outcome
 - Short-term
 - Overdoses, fatal and non-fatal
 - Health measures (cardiovascular, injuries, adverse events)

- Psychological outcomes
- Long-term
 - Health measures
 - Psychological outcomes
 - Employment status

Final abstracted data will be available in the data repository SRDR+. ⁷⁴

Assessment of Methodological Risk of Bias of Individual Studies

For cross-sectional studies, on patterns and trends in prescription stimulant misuse, we used key items from the JBI Checklist for Prevalence Studies⁴ which covers sampling, data collection, reporting, and statistical analysis.

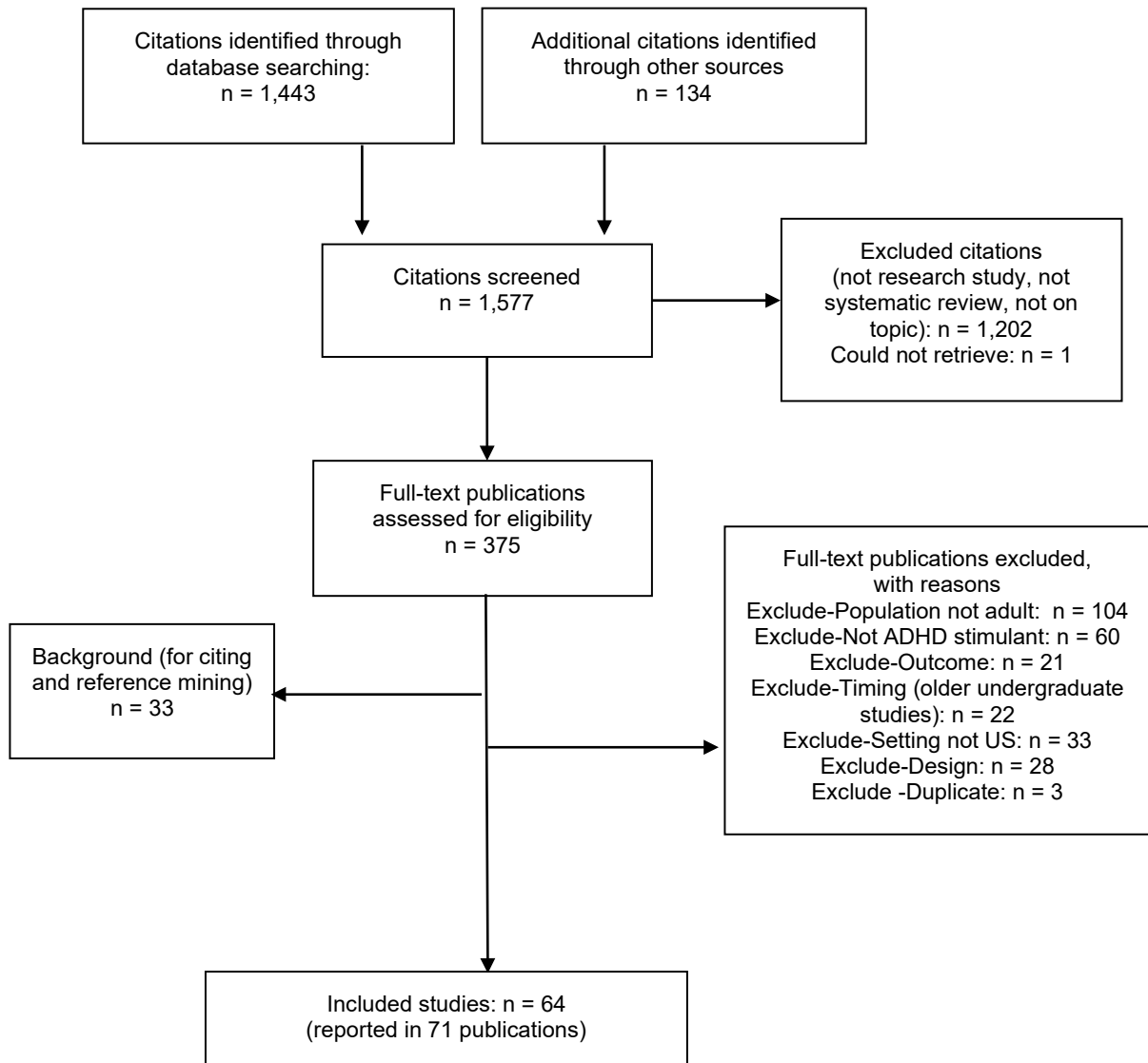
For longitudinal studies we used the six item QUIPS tool⁵ which covers study participation, attrition, prognostic factor measurement, outcome measurement, confounding, and statistical analysis.

We incorporated the risk of bias into the rating of evidence certainty; confidence in the findings was reduced when studies had serious risk of bias.

Data Synthesis

Due to the expedited timeline of the Rapid Review, meta-analysis was not conducted. Thus, all findings are presented narratively along with some tables and graphs.

Appendix B. Literature Flow Diagram



Appendix C. Evidence Tables

Table C-1. Evidence table for longitudinal studies

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
Barringer, 2022 ⁶ Data source: University of Wisconsin, Madison Region: Midwest Setting: College(s) / university (ies) Study size: n = 297	Population Mean age (SD): NR, Min age: 18, Max age: 21 % Hispanic or Latino: 6.7 % Black/African American: 2.4 % White: 83.2 % Asian: 8.1 % Multiracial: 2.4 % Female: 69 ADHD Medications Not specified	Who misuses?: Participants recorded daily behavior and thoughts. Intent to misuse was significantly associated with being female (OR 1.40, CI 1.01 - 1.95), White non-Hispanic (1.81, 1.35- 2.43) and having received a stimulant medication prescription in their lifetime (2.15, 1.49 - 3.11) and less likely among participants reporting more adverse family backgrounds (0.46, 0.24 - 0.87). Why?: Lower GPA was significantly associated with intent to misuse (0.88, .0.81 - 0.95), as was final exams period (1.51, 1.36 - 1.69). How acquired?: NR How frequent?: NR Mode of administration: NR	Health: NR Psychological: NR Polysubstance use: NR Other: NR	Study participation: Moderate Study attrition: Moderate
Chen, 2014 ⁷ Chen, 2014 ^{7,5} Data source: NSDUH 2006–2011 Region: National Setting: Community Study size: n = 6103	Population Mean age (SD): NR, Min age: 18, Max age: NR Other age information: 18-25: 87.6%, 26 or older: 12.4% % White: 84 Other: "Minorities" 16% % Female: 44.8 ADHD Medications Amphetamine and dextroamphetamine,	Who misuses?: NR Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR Who misuses?: NR Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR	Health: NR Psychological: Nonmedical ADHD stimulants users, Past- year: Depression 11.8%, Anxiety 8.5%, Psychological distress 21.8%, Mental health treatment 18.4%, SUD treatment 4.8% Polysubstance use: Problematic substance	Study participation: No race data other than white, all other groups as "minorities" Study attrition: Low

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
	Methylphenidate, Dextroamphetamine, Lisdexamfetamine, Other: Dextroamphetamine, Cylert		use among nonmedical ADHD stimulants users: alcohol 64.2%, marijuana 43.6%, cocaine 10.6%, tranquilizers/sedatives 8.8%, hallucinogens 8.4%, heroin 2.5%), inhalants 2.3%, pain relievers 2.1%. Authors used latent class analysis to create 4 use categories. 53.3% had LOW probability of problem use of other substances. Those in other (multiple substance problems) classes were more likely to have all types of mental health problems, mental health and substance service use, deviant behaviors and arrests even after adjustment for socio- demographic characteristics. Other: Arrested past year, of those who misused prescription stimulants: 15.6%	
Fairman, 2021 ⁸ Data source: 7 universities in Georgia Region: South Setting: College(s) / university (ies) Study size: n = 2927	Population Mean age (SD): 20.54 (1.94), Min age: 18, Max age: 25 % Hispanic or Latino: 7.8 % Black/African American : 22.7 % White : 65.1	Who misuses?: 7.5% of students used ADHD stimulants in past 4 months. Of these, 54.3% reported they were either diagnosed with ADHD and/or prescribed these drugs. The most often used stimulant was	Health: NR Psychological: Difficulty falling asleep 46.0%, headaches 19.0%, feeling fidgety 24.0%, feeling anxious 21.0%, not feeling hungry 43.0%.	Study participation: Moderate no comparison of respondents with entire population Study attrition: Low 86.9%

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
	% Asian : 6.4 Other : 5.9% % Female: 64.7 ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate, Lisdexamfetamine	amphetamine mixed salts (Adderall) (42.9%), followed by lisdexamfetamine (Vyvanse) (27.4%) and methylphenidate (Ritalin, Concerta, Metadate) (13.2%). In multivariate model, use without prescriptions/diagnoses was significantly associated with being male (p .02), lower parental education (p .008), attending private school compared to technical school (p .032), not having depression (p .014) or anxiety (p .033) related diagnoses, and past 30-day marijuana (p .008) and tobacco (p .015) use. 10.50% of adults who misused reported ADHD symptoms. Why?: To be more productive with schoolwork 61.6%, to concentrate better 64.4%, to feel more focused 61.6%, to get work done more efficiently 54.8%, to feel less distracted 53.0%. stay awake 46.0%, have a more enjoyable time 15.0%, party longer 13.0%. How acquired?: Own prescription 44.3%, given by someone 30.1%, bought from someone 17.8%, bought online 6.4%. How frequent?: NR Mode of administration: NR	Polysubstance use: Prevalence among adults who misused ADHD stimulant, past 30 days: Alcohol 94.0%, Marijuana 60.0%, Tobacco 68.0%. Other: NR	

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
Frands, 2022 ⁹ Data source: 1 university in the Southeast, 2 in the Northeast Region: Multiple Setting: College(s) / university (ies) Study size: n = 144	Population Mean age (SD): 21.32 (0.48), Min age: 18, Max age: 25 % Black/African American: 15.3 % White: 72.2 % Asian: 6.9 % Multiracial : 7.0 Other / not reported: 4.9% % Female: 56.9 ADHD Medications Not specified	Who misuses?: 32.6% reported any misuse in lifetime. Males were more likely than females to have misused (p .003). Differences among races were not significant (p .430). Why?: 42.3% of misusers did so to perform better in schoolwork. How acquired?: 24.3% had tried someone else's prescription stimulant medication. 41% agreed that prescription stimulants were easy to get on their campus; 42.4% neither agreed nor disagreed. How frequent?: NR Mode of administration: NR	Health: NR Psychological: In a multivariate regression model, inattentive symptoms were the only significant predictor of stimulant misuse (OR=1.09, CI 1.05, -1.15, p .001). Symptoms of anxiety and depression were not statistically significant in the model Polysubstance use: NR Other: NR	Study participation: Low Study attrition: High 31.6 % participated in 4 year follow up
McCabe, 2017 ¹¹ Data source: Monitoring the Future Region: National Setting: Community Study size: n = 8,373	Population Mean age (SD): NR, Min age: 18, Max age: 35 Other age information: aged 35 or 36 at follow up % Hispanic or Latino: 6.4 % Black/African American: 11.9 % White: 73.5 % Multiracial: 8.1 % Female: 53 ADHD Medications Not specified	Who misuses?: 16.7% misused as high school senior. Specific demographic predictors not reported. Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR	Health: NR Psychological: NR Polysubstance use: Those with both medical and nonmedical use at age 18 (p .01) and those with only nonmedical use at age 18 (p .001) were more likely to have at least two SUD symptoms at age 35. Other: Adolescents who misused (with or without medical use) had lower educational attainment in adulthood.	Study participation: Low less than 1% refused, non-response due to being absent that day Study attrition: Low attrition weights to account for respondent characteristics associated with nonresponse at followup
McCabe, 2024 ¹²	Population	Who misuses?: Per multivariate regression analysis, there was no significant effect of prescribed	Health: NR Psychological: NR	Study participation: Low

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
Data source: Monitoring the Future - longitudinal follow-up Region: National Setting: College(s) / university (ies) Study size: n = 11905	Mean age (SD): NR, Min age: 18, Max age: 24 % Hispanic or Latino: 15.7 % Black/African American: 11.8 % White: 56.9 % Asian: 4.9 Other: 8.1 % % Female: 51.9 ADHD Medications Not specified	stimulant therapy for ADHD at age 18 and past year nonmedical stimulant use during young adulthood. Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR	Polysubstance use: Per multivariate regression analysis, there was no significant effect of prescribed stimulant therapy for ADHD at age 18 and past year cocaine use during young adulthood. Other: NR	Study attrition: High retention rate was 50.6% at 6 years
McCabe, 2023 ¹⁰ Data source: Monitoring the Future Region: National Setting: Community Study size: n = 5034	Population Mean age (SD): NR, Min age: 19, Max age: 24 % Hispanic or Latino: 14.3 % Black/African American: 10.9 % White: 54.6 % Asian: 3.5 Other: 15.7% % Female: 52.0 ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate, Dextroamphetamine	Who misuses?: In logistic regression, no association of any demographics with any drug use outcomes. Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR	Health: NR Psychological: NR Polysubstance use: In logistic regression analysis, adolescents with prescription stimulant misuse (PSM) had the highest adjusted odds of later cocaine and methamphetamine use at 19 to 24 years of age vs population controls. Adolescents who reported PSM with no history of stimulant therapy for ADHD at baseline had > 2.5 times greater adjusted odds than population controls of cocaine or methamphetamine initiation (2.64, CI, 1.54- 4.55). Other: NR	Study participation: Low Study attrition: Moderate

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
Schepis, 2021 ¹³ Data source: Texas State University, San Marcos Region: South Setting: College(s) / university (ies) Study size: n = 41	Population Mean age (SD): 20.5 (1.57), Min age: 18, Max age: 25 % Hispanic or Latino: 29 % White: 56 % Female: 66 ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate, Lisdexamfetamine	Who misuses?: 41 students who misused M (≥ 6 past-year episodes) were recruited; 36.6% had a current stimulant medication prescription. Most commonly misused medication was Adderall (65.1% of episodes), followed by Vyvanse (23.0%), and generic methylphenidate (3.6%); other medications were used in 8.3% of episodes. Why?: To concentrate 72.1%, to study better 66.3%, to stay awake 57.0%, to feel better/get high 17.4%, to lose weight 9.3%. How acquired?: Used own medication 36%, bought from a friend 27.8%, free from friend/roommate 18.8%, bought from a stranger/dealer 12.5%. How frequent?: Participants recorded 258 prescription stimulant misuse episodes in the 21-day assessment period for a mean 0.38 (SD= 0.7) misuse episodes per day. When prescription stimulant misuse occurred, 88.8% of days had one prescription stimulant misuse episode, 10.8% two and 0.4% three. Mode of administration: NR	Health: NR Psychological: On prescription stimulant misuse days, participants were more alert (p .001), attentive (p .001), inspired (p .004), determined (p .001) and active (p .005) as measured by the Positive and Negative Affect Scale (PANAS) Short Form. Polysubstance use: NR Other: NR	Study participation: Moderate recruited via flyers, email - unknown response rate Study attrition: Low 91% completion
Westmoreland, 2021 ¹⁴ Data source: Together 5000 (T5K), a U.S. national, internet-	Population Mean age (SD): NR, Min age: 16, Max age: 49 Other age	Who misuses?: At baseline, 10.2% of participants reported misusing prescription stimulants. Misuse was associated with	Health: NR Psychological: NR	Study participation: Low Study attrition: Moderate 77.5% completed 1 year follow up

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
based cohort study of men, transgender (trans) men, and trans women who have sex with men Region: National Setting: Community Study size: n = 4857 Completed baseline & 1 year follow-up	information: 16-24 years old (18.2%) 25-35 years old (52.1%) 36-45 years old (22.4%) 46-55 years old (7.4%) % Hispanic or Latino: 24.0 % Black/African American: 10.0 % White: 53.7 % Asian: 3.8 % Multiracial: 8.6 % Female: NR; Other sex information: Cisgender man 97.7%, Transgender man 0.7%, Transgender woman 0.5%, Other 1.1% ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate	younger age group, White race/ethnicity, housing instability, sex work, history of incarceration, and injection drug use in bivariate analysis; however, the authors did not conducted multivariate analysis to adjust for confounders, so validity is questionable. Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR	Polysubstance use: At baseline, 10.2% of participants reported misusing prescription stimulants; Those who misused prescription stimulants (as compared to no stimulant use) but not methamphetamine at baseline had 2.51 times the odds (95% CI: 1.44 – 3.59) of reporting past three-month methamphetamine use at 12 months. Other: NR	
Winters, 2011 ¹⁵ Data source: Minnesota Competence Enhancement Project Region: Midwest Setting: Other: community Study size: n = 149	Population Mean age (SD): 21.97 (1.27), Min age: NR, Max age: NR Other age information: Age mean at T6 % White: 93 % Female: 19 ADHD Medications Not specified	Who misuses?: NR Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR	Health: NR Psychological: NR Polysubstance use: Children with ADHD were followed for 15 years and compared to controls with no ADHD. No evidence was found to support that childhood treatment with stimulant medication was associated with any change in risk for adolescent or young adulthood substance use disorder. Other: NR	Study participation: Low Entire population of youths scoring that exceeded 1.75 SD above mean in disruptive behavior Study attrition: High 52% attrition, some important differences between completers and those who did not respond after T1

Abbreviations: ADHD = Attention-deficit/hyperactivity disorder; CI = 95% confidence interval; GPA = grade point average; NR = Not Reported; NSUDH = National Survey on Drug Use and Health; SD = standard deviation; SUD = substance use disorder

Table C-3. Evidence table for cross-sectional studies

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
Antshel, 2021 ¹⁶ Data source: Syracuse University Region: Northeast Setting: College(s) / university (ies) Study size: n = 309	Population Mean age (SD): 18.9 (1.5), Min age: 18, Max age: 31 % Hispanic or Latino: 5 % Black/African American: 11 % White: 70 % Asian: 10 % Female: 62 ADHD Medications Not specified	Who misuses?: History of stimulant misuse within the past year: 12.9%. Significantly more males (17.1%) than females (9.4%) reported stimulant misuse. Age, year in school, Greek status, and race/ethnicity were not associated with misuse, likely due to low statistical power / small sample size. Higher levels of procrastination, sensation-seeking traits, ADHD symptoms, and executive functioning problems were associated with misuse. Why?: NR How acquired?: NR How frequent?: Three or fewer times per year 76.3%, two or fewer times per month 21.0%. Mode of administration: NR	Health: NR Psychological: NR Polysubstance use: Higher alcohol and cannabis use were associated with misuse. Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes looks like 100% response, instrument administered in class Was the response rate adequate, and if not, was the low response rate managed appropriately? Unclear not addressed. presumably all students completed in class
Baker, 2022 ¹⁷ Data source: 15 universities Region: National Setting: College(s) / university (ies) Study size: n = 6510 Of 58,000 contacted	Population Mean age (SD): NR, Min age: NR, Max age: NR, Other age information: NR Race: NR % Female: NR ADHD Medications Not specified	Who misuses?: 14.5% had ever misused; of these, 56.2% had misused at least once in the past 12 months. Of those who ever misused, 1% misused in middle school or earlier, 29% began in high school, 63% began in college, 3% began between college and graduate school, and 2% began in graduate/professional school. Why?: Not mutually exclusive: 76.1% to study or improve grades, 24.1% to enhance social situations, 23.8% to see what it was like, 14.9% to get	Health: NR Psychological: 62% felt a positive effect on grades, 19% felt it caused emotional problems, 18% of students who misused had felt depressed. Polysubstance use: Misuse with alcohol: very often 1%, often 7% sometimes 15%. Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Unclear No comparison of respondents with total student population Was the response rate adequate, and if not, was the low response rate managed appropriately? No 11.2%, no description of how managed

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
		high, 12.9% because they like the way they feel. How acquired?: 9% obtained from a pharmacy, 6% from a relative, 15% from a peer who is not a friend, 77% from a friend. How frequent?: In the past 12 months: 1-9 times 43%, 10-19 times 7%, 20-49 times 4%, 50 or more times 2%. Of those who misused to study, 70% misused during finals or exams, 51% before a test or project, 47% when they felt behind, 20% when they wanted to get ahead, 5% when they needed a competitive edge, and 10% used continuously throughout the term. Mode of administration: Oral 94%, snort nasally 26%, inject 1%, smoke 8%, and 3% reported other route of administration.		
Black, 2023 ¹⁸ Data source: Researched Abuse, Diversion, and Addiction-Related Surveillance System routine web-based drug survey of the general adult population, the Survey of Non- Medical Use of Prescription Drugs (NMURx) Program Region: National Setting: Community	Population Mean age (SD): NR, Min age: 18, Max age: NR, Other age information: 18-24: 2.4%, 25-29: 2.7%, 30- 39: 24.5%, 40-49: 22.3% 50-59: 19.2%, 60+: 27.0% % Hispanic or Latino: 10.8 % Black/African American: 7.2 % White: 86.9 % Asian: 3.6 % Female: 41.6	Who misuses?: Survey of persons reporting any lifetime use of prescription or nonpharmaceutical stimulants. Lifetime use of a prescription stimulant: 55.7%, lifetime use of a nonpharmaceutical stimulant: 81.0%. Through Latent Class Analysis, three subtypes of initiation were identified: 1) a slower, more conservative initiation pattern engaging in few behaviors, 2) a distinct initiation of illicit drugs to get high with oral or snorting use, and 3) a more varied, less discriminating initiation pattern engaging in many behaviors.	Health: NR Psychological: NR Polysubstance use: Individuals initiating stimulant use before 23 years of age had slightly higher DAST-10 (Modified Drug Abuse Screening Test, measures problematic drug use) scores and were more likely to have used other drugs in their lifetime. Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes nationally representative Was the response rate adequate, and if not, was the low response rate managed appropriately? Not applicable

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
Study size: n = 1329	ADHD Medications Not specified	Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR		
Butler, 2021 ¹⁹ Data source: college students via YouGov Region: National Setting: Community Study size: n = 3379	Population Mean age (SD): NR, Min age: 18, Max age: 26 Other age information: 18-20= 33.3%, 21-23= 40.3%, 24-26= 26.3% % Hispanic or Latino: 9.7 % Black/African American: 11.1 % White: 65.6 % Asian: 8.4 % Multiracial: 2.7 Other: 1.2 middle eastern, 0.4 % other % Female: 59.9 ADHD Medications Not specified	Who misuses?: 14% reported prescription stimulant misuse. 43.2% of students who misused reported a lifetime diagnosis of ADHD of which 70% were diagnosed at age 16 or older. Of students who misused 77.6% reported a lifetime psychiatric diagnosis (depression, anxiety, or bipolar disorder), 29.6% reported a lifetime alcohol or substance use disorder, binge alcohol use in the past 30 days was reported by 12%, while lifetime use of cocaine, heroin and illicit stimulants ranged from 15.8% for heroin to 35.4% for cocaine. Lifetime non-medical use of prescription opioid medication was 58.6% and marijuana use was reported by 73.7% Why?: Enhancing work or school performance 47.7%, increased energy 23.3%, getting high or enhancing the effect of other drugs 14.6%. 31.8% of those who snorted (but did not inject) did so to get high, as did 52.9% of injectors. 35.3% of injectors used to control weight. (There were only 17 injectors, so data may not reflect US patterns.) How acquired?: 67.3% obtained the medication from a family member or friend, 39.7% had their own prescription. Of those who snorted (but did not inject) 29.6% purchased	Health: NR Psychological: 43.2% of students who misused reported a lifetime diagnosis of ADHD of which 70% were diagnosed at age 16 or older, 77.6% reported a lifetime psychiatric diagnosis (depression, anxiety, or bipolar disorder), 29.6% reported a lifetime alcohol or substance use disorder. Polysubstance use: More than 90% reported polysubstance use with 55% using illicit substances other than marijuana, 43.3% using illicit substances prior to prescription stimulant non-medical use, 24.6% used both at the same age, 32% engaged in non-medical use of prescription stimulants prior to using illicit substances, prescription stimulant non-medical use preceded prescription opioid NMU 45% of the time, 27.9%	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes Was the response rate adequate, and if not, was the low response rate managed appropriately? Not reported

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
		from dealer, 21.6% bought online without a doctor visit, 12.5% traded something for it, and 5.7% stole from a stranger. How frequent?: NR Mode of administration: 92% reported oral; 83.4% swallowed whole, 14.8% by chewing, and 18.3% dissolved in a liquid to drink; 23.2% reported at least one nonoral route of administration: 20.4% snorting, 6% smoking, 3.5% injection. Among 112 non-oral users, 88.4% reported snorting, 25.9% reported smoking, and 15.2% reported injecting. Non-oral use was associated with being male; obtaining medication from a dealer, use to get high, and/or a substance use disorder diagnosis.	initiated prescription stimulants alone or at the same age as other drugs. Other: NR	
Carlson, 2022²⁰ Data source: 7 universities Region: National Setting: College(s) / university (ies) Study size: n = 787	Population Mean age (SD): 20.65 (3.89), Min age: NR, Max age: NR % Hispanic or Latino: 5.2 % Black/African American: 6.0 % White: 61.9 % Asian: 2.2 % Multiracial: 23.5 Other: 0.8% other % Female: 66 ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate, Dextroamphetamine	Who misuses?: 17% (N = 787) of respondents reported ADHD stimulant misuse in past year; 83% of these misused less than monthly. Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR	Health: NR Psychological: Most common consequences were related to self-care, including "I have not slept properly" (44%) and "I have not eaten properly" (43%). The authors conducted factor analysis on the COPE Inventory instrument, finding 3 factors: maladaptive coping, adaptive coping, and supportive coping. Stimulant use predicted more maladaptive coping (p .05), which in turn,	Was the data analysis conducted with sufficient coverage of the identified sample?: Unclear if respondents reflect the entire undergraduate population Was the response rate adequate, and if not, was the low response rate managed appropriately? Not reported

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
			predicted more stimulant-related consequences (p .01) for women. Polysubstance use: NR Other: NR	
Cassidy, 2015²¹ Data source: YouGov® Region: National Setting: Community Study size: n = 10000	Population Mean age (SD): NR, Min age: 18, Max age: 49 Other age information: 18 to 24 years 18.4%; 25 to 29 years 14.8%; 30 to 34 years 14.1%; 35 to 39 years 16.7%; 40 to 44 years 16.7%; 45 to 49 years 19.4% % Hispanic or Latino: 9.2 % Black/African American: 10.4 % White: 72.6 % Asian: 2 % Multiracial: 2.3 Other: 2.5%; Middle Eastern 0.2%; Unknown <0.1% % Female: 53.4 ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate, Lisdexamfetamine	Who misuses?: In regression model, past year misuse significantly associated with: 18 to 25 years old, ADHD symptoms, binge alcohol in past month, past year marijuana use, past year cocaine use. Not associated with race, sex, educational level, prescription status. Why?: Most frequent reasons (% reported by specific stimulant): to perform better at work, school or other task or "to stay awake, feel more alert", followed by "to feel good or to get high." A relatively small percentage "because they are safer than street drugs." How acquired?: Reported by specific medication: obtained the drugs from family/friends (67% to 91%), "dealer" (all <20%), internet (all < 10%, except Vyvanse 17%) How frequent?: Rates of NMU (per 100,000 prescriptions dispensed): Ritalin 1.62 , Adderall 1.61, Adderall XR 0.62, Concerta 0.19, and Vyvanse 0.13. Mode of administration: Oral (94.7% for Concerta to 80.7% for Ritalin), snorting (Ritalin, 39.6%), injecting or smoking (6% or less). Who misuses?: Per NSDUH, nonmedical users of ADHD stimulants	Health: NR Polysubstance use: Of the 224 individuals reporting past-year NMU of prescription stimulants, nearly half (47.3%) reported "typically" using other substances (e.g., alcohol, illicit substances, pain medications) at the same time as prescription stimulants. Marijuana (76.4%) and alcohol (63.2%) were most commonly used in combination with prescription stimulants, followed by prescription pain relievers (18.9%), other prescription medications (<10.0%), or illegal drugs (approximately 11.0% or less). Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: No Hispanics underrepresented, highly educated over-represented Was the response rate adequate, and if not, was the low response rate managed appropriately? No 41.8% response rate
Chen, 2016 ²²	Population		Health: NR	Was the data analysis conducted with sufficient coverage of the identified

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
Data source: National Disease and Therapeutic Index, DAWN, and NSDUH Region: National Setting: Community Study size: n = NDTI: 26,469; NSDUH: 338,495; DAWN: 1,648,992	Mean age (SD): NR, Min age: 18, Max age: NR Other age information: 18-25: NDTI 19%, NSDUH 66%, DAWN 20%; 26- 34: NDTI 11%, NSDUH 6%, DAWN 19%; 35-49: NDTI 17%, NSDUH 3%, DAWN 28%; 50+: NDTI 15%, NSDUH 0%, DAWN 18% % Hispanic or Latino: NDTI 4%, NSDUH 7%, DAWN 5% % Black/African American: NDTI 7%, NSDUH 2%, DAWN 7% % White: NDTI 86%, NSDUH 83%, DAWN 68% Other: NDTI 3%, NSDUH 7%, DAWN 1% % Female: NDTI: 42%, NSDUH: 47%, DAWN: 53% ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate, Dextroamphetamine	were commonly males (dextroamphetamine-amphetamine: 55.6%, methylphenidate: 53.7%), age group of 18-25 years (dextroamphetamine-amphetamine: 59.7%, methylphenidate: 50.8%), white (dextroamphetamine- amphetamine: 86.4%, methylphenidate: 86.8%). Per DAWN, ED visits from dextroamphetamine- amphetamine use were more frequent among females (54.9%), those aged 35-54 years (26.4%), and whites (86.8%). ED visits involving methylphenidate use were equally common in both sexes (50.0%), more frequent in those aged 12-17 years (26.8%), and in whites (91.1%). Among adults, there was an increasing trend over 6 years for ED visits involving dextroamphetamine- amphetamine and methylphenidate use. Why?: NR How acquired?: Friends or relatives: 56.1% to 68.3%, MD prescription (to friends, self, others): 69.3% to 83.2%. Participants who used both dextroamphetamine-amphetamine and methylphenidate nonmedically were more likely to obtain the drug from physician sources (p=0.009). How frequent?: NR Mode of administration: NR	Psychological: NR Polysubstance use: 45% of dextroamphetamine- amphetamine-related ED visits and 53.6% methylphenidate-related ED visits were single drug use. Alcohol was present in 16.1%, illicit drugs in 18.3%, and nonmedical use of other medications in 47.6% of dextroamphetamine- amphetamine-related ED visits. Alcohol was present in 13.1%, illicit drugs in 11.2%, and nonmedical use of other medications in 39.7 % of methylphenidate-related ED visits. Other: NR	sample?: Yes large nationally representative samples Was the response rate adequate, and if not, was the low response rate managed appropriately? Yes
Cole, 2020 ²³	Population	Who misuses?: In past year, 8.9% misused stimulants (but not other hard drugs); 11.0% misused both. Being	Health: NR Psychological: Higher levels of stimulant misuse	Was the data analysis conducted with sufficient coverage of the identified sample?: No

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
Data source: University of North Carolina Region: South Setting: College(s) / university (ies) Study size: n = 1534	Mean age (SD): NR, Min age: 18, Max age: 23 % Hispanic or Latino: 6.4 % Black/African American: 14.8, % White: 66.1 % Asian: 11.8 % Multiracial: 5.4 Other: 1.6% reported as Other/Unknown % Female: 59.8 ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate	male (OR 2.17, CI 1.68 - 2.79) and White (1.86, 1.26 - 2.76) were significantly associated with prescription stimulant misuse. Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR	were significantly associated with increased impulsivity, measured by the Urgency Premeditation Planning Sensation Seeking Impulsivity Scale (p .001) and increased substance use consequences measured by an adapted version of the Rutgers Alcohol Problems Index (p .001). Those who misused prescription stimulants appear similar to users of other hard drugs (e.g., cocaine, opioids) in terms of overall risk. Polysubstance use: Those who misused prescription stimulants were more likely than nonusers to use tobacco (p .001), marijuana (p . 001), binge drink (p .001) , but less likely than those who used both stimulants and other hard drugs (p .001, p .001, p .001). Other:	Was the response rate adequate, and if not, was the low response rate managed appropriately? No
Compton, 2018 ²⁴ Data source: NSDUH 2015-2016 Region: National Setting: Community	Population Mean age (SD): NR, Min age: 18, Max age: NR Other age information: Mean (SD) and range not reported Race: NR	Who misuses?: High frequency misuse (7+ days of past-month misuse) was significantly associated with ages 30-49, non-Hispanic whites, less than high school education, being disabled for work, divorced/separated adults. In logistic regression, adults	Polysubstance use: High frequency misuse (7+ days of past-month misuse) was associated with past-year cocaine or heroin use disorders, past-year inhalant use or	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes Was the response rate adequate, and if not, was the low response rate managed appropriately? Yes

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
Study size: n = 102,000	% Female: NR ADHD Medications Not specified	who misused prescription stimulants were significantly more likely to be male, under age 50, college graduates, and of lower incomes as well as to report both licit and illicit substance use problems. Significantly less likely to be Black, on Medicaid Why?: 56.3% to help be alert or concentrate, 21.9% to help study, 15.5% to get high/hooked, adjust other drug effects, or to experiment , 4.1% misuse for weight loss. Adults who misused prescription stimulants with high frequency (7+ days in the past month) were more likely to misuse stimulants to help be alert or concentrate (54.4%) and were less likely to misuse stimulants to help study (24.6%). Those with stimulant use disorders were more likely to misuse stimulants for substance use related reason (to get high/hooked, adjust drug effect, or to experiment) (14.8%) or for losing weight (3.8%) and were less likely to misuse stimulants for helping study (23.1%). How acquired?: 56.9% friends/relatives for free , 21.8 buying/stealing from friends/relatives. Among those who obtained prescription stimulants from friends or relatives for free, 83.9% reported that their friends or relatives received the prescription stimulants from one doctor. Those reporting high frequency misuser (7+ days in the past month)	use disorders, and prescription tranquilizer, sedative, or opioid misuse or use disorders (all p .05). Other: A higher % of people with suicide ideation in past year misused stimulants (without stimulant use disorder) 6.2%; prevalence in those without suicide ideation 1.7%.	

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
		were less likely to obtain stimulants from their friends/relatives for free (58.8%) and were more likely to obtain them from one or more doctors (10.1%) or from drug dealers/strangers (4.0%). Those with stimulant use disorders were less likely to obtain stimulants from friends/relatives for free (9.2%) and were more likely to obtain them from one or more doctors (8.6%) or from drug dealers/strangers (83.9%). How frequent?: Among those who misused prescription stimulants: misused past year but not past month 68.3%, misused 1-2 days past month 16.4%, misused 3-6 days past month 9.1%, 7 or more days past month 6.2%. Mode of administration: NR		
Dwyer, 2022 ²⁵ Data source: Eastern Michigan University, Rowan University Region: Multiple Setting: College(s) / university (ies) Study size: n = 116	Population Mean age (SD): NR, Min age: 18, Max age: 23 % Hispanic or Latino: 2.6 % Black/African American: 5.2 % White: 74.1 % Asian: 6.0 Other: 12.1% % Female: 50 ADHD Medications Amphetamine and dextroamphetamine,	Who misuses?: Study of students who misused in past year. Participants were predominantly white, between 18 and 23 years old, with a 3.0 or higher GPA, were employed at least part-time, and had at least enough money for necessities. Why?: "Preferred" reason on scale of 1 (most important) to 8: Help focus better= Mean 2.22 (1.38), Improve academic achievement= Mean 2.51(1.47), Feel awake and boost energy alertness= Mean 3.00(1.47), Help get along better with others= Mean 4.68(1.70), Feel on top of the world= Mean 4.85 (1.90), Improve athletic performance =Mean 5.84	Health: NR Psychological: NR Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: No, high prevalence of White participants Was the response rate adequate, and if not, was the low response rate managed appropriately? Unclear

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
	Methylphenidate, Lisdexamfetamine	(1.79), Reduce appetite= Mean 5.99 (1.82), Counteract effects of drugs/alcohol= Mean 6.92 (1.23). How acquired?: NR How frequent?: Past year: 1–2 times 31.9%, 3–5 times: 13.0%, 6+ times: 13.0. Mode of administration: Oral 99.1%, Nasal 19.8%, Intravenous 1.7%, Other 0.9%.		
Faraone, 2019 ²⁶ Data source: U.S. National Poison Data System Region: National Setting: Healthcare Study size: n = 9713 9713 adults, 6163 adolescents	Population Mean age (SD): 31.5 (11.03), Min age: 18, Max age: NR Other age information: N/A Race: NR % Female: 50.39 ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate	Who misuses?: From 2012 through 2016, there were 33,239 incidents to US poison control centers for non medical use of prescription amphetamine (AMP) and methylphenidate (MPH) among persons age 12 or older. 15,876 had data available for analyses; 9,713 were adults. Why?: NR How acquired?: NR How frequent?: NR Mode of administration: Injection (1.0%), oral intentional (70.3%), nasal (3.8%), unintentional oral (24.9%). Non-oral use remained steady over the 5 years, while oral increased about 7% per year (p .000). Nasal and injection use were more common among males (p .000). 74% of intentional oral were suicide attempts (p .000 vs other modes).	Health: NR Psychological: NR Polysubstance use: NR Prevalence of another substance was 46% for oral (intentional misuse), 65% for nasal, 50% IV (p .000). Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes Was the response rate adequate, and if not, was the low response rate managed appropriately? Yes
Fossos-Wong, 2022 ²⁷ Data source: study of web-based intervention for alcohol-related risky	Population Mean age (SD): 19.17 (0.79), Min age: 18, Max age: 20	Who misuses?: 18% misused in past 3 months; logistic regression analysis found Whites, males, and those with higher perceived peer use and peer	Health: NR Psychological: NR Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Unclear, significantly higher

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
sexual behavior in ages 18 -20 Region: National Setting: Other: study evaluating a web- based intervention for alcohol-related risky sexual behavior Study size: n = 1065	% Hispanic or Latino: 15.1 % Black/African American: 7.9 % White: 70.5 % Asian: 9.7 Other: 3.9% % Female: 54.5 ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate, Dextroamphetamine	willingness significantly more likely to misuse. Why?: NR How acquired?: NR How frequent?: Of those with misuse in the past 3 months, the median was 3 times (Mean = 6.5, SD = 11.6). Mode of administration: NR		college enrollment than general population of same age Was the response rate adequate, and if not, was the low response rate managed appropriately? Yes, 93% response rate
Freeman, 2023 ²⁸ Data source: Kentucky Office of Vital Statistics and KASPER prescription records Region: South Setting: Healthcare Study size: n = 2248	Population Mean age (SD): NR, Min age: 18, Max age: NR Other age information: <18: 0.5%, 18-24: 5.8%, 25-34: 21.6%, 35-44: 29.8%, 45-54: 21.8%, 55-64: 16.5%, 65+: 4.0% % Hispanic or Latino: 1.3 % Black/African American: 10.3 % White: 87.9 Other: 0.5% % Female: 32.8 ADHD Medications Not specified	Who misuses?: NR Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR	Health: Rate of fatal overdose in Kentucky, Stimulant medication without opioid involvement (n=258): Overall: 5.7/100,000; age 25-34: 7/100,000, 35-44: 10.7/100,000, 45-54: 13.4/100,000, 55-64: 10.7/100,000; White non- Hispanic (NH): 6.2/100,000, Black NH: 6.4 Psychological: NR Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Not applicable entire population Was the response rate adequate, and if not, was the low response rate managed appropriately? Not applicable
Han, 2025 ²⁹ Data source: NSDUH 2022, IQVIA Region: National	Population Mean age (SD): NR, Min age: 18, Max age: 64 Other age information:	Who misuses?: 7.5% (95% CI, 7.1%- 7.8%) of US adults reported prescription stimulant use in the past year, among those, 25.3% (95% CI, 23.8%-26.8%) reported misuse -	Health: NR Psychological: NR Polysubstance use: Increased prevalence of	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
Setting: Community Study size: n = 83762	Unweighted: 33.8% were 18 to 25; 53.0% were 26 to 49, 14.0% were 50 to 64 Race: NR % Female: 56 ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate	meaning about 2% of American adults misused these drugs. 9.0% (95% CI, 8.0%-10.0%) of prescription stimulant users had prescription stimulant use disorder (PSUD); compared with methylphenidate users, amphetamine-based medication users had a higher rate of misuse (3.1 [95% CI, 2.2-4.3]) and PSUD (2.2 [95% CI, 1.3-3.8]). Increased prevalence of prescription stimulant misuse was associated with being never married; annual family income less than \$75 000; major depressive episode; and suicidal ideation. Why?: Any past-year misuse: Help concentrate 33.7%, be alert 28.4%, help study 12.0%, Get high / hooked /adjust to other drug effects / experiment 16.3%, lose weight 4.5%, other 5.1% With prescription stimulant use disorder: Help concentrate 34.0%, be alert 33.6%, help study 5.5%, * Get high / hooked /adjust to other drug effects; / experiment 16.0%, lose weight 3.7%, other 7.2% (* = significant difference from those reporting any misuse) How acquired?: Any past-year misuse: Free from friend/relative 45.8% , Bought/stole from friend/relative 23.3%, From doctor(s) 20.2% , Drug dealer/stranger 3.9% Other 6.9%; With prescription stimulant use disorder: Free from friend/relative 23.4% , * Bought/stole from	prescription stimulant misuse was associated with nicotine dependence; alcohol, cannabis, cocaine, methamphetamine, and heroin use or use disorders; and prescription opioid, sedative, or tranquilizer misuse or use disorders. Other: NR	Was the response rate adequate, and if not, was the low response rate managed appropriately? Yes

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
		friend/relative 24.6%, From doctor(s) 38.5% * Drug dealer/stranger 5.1%, Other 8.3% (* = significant difference from those reporting any misuse) Per IQVIA, the number of ADHD stimulant prescriptions order by nurse practitioners or physician assistants more than doubled from quarter 1, 2019 to quarter 4 , 2022. How frequent?: Those with any past-year misuse, number of days of misuse in the past month: 0 68.2%, 1-2 14.3%, 3-5 8.2%, 6 or more 9.3% Mode of administration: NR		
Holm, 2022⁴⁰ Data source: Colorado State University Region: Midwest Setting: College(s) / university (ies) Study size: n = 334 36 students who misused prescription stimulants, 298 who did not	Population Mean age (SD): 19.87 (3.20), Min age: NR, Max age: NR % Hispanic or Latino: 9 % Black/African American: 1 % White: 63 % Asian: 7 Other: 13% other or mixed race % Female: 76 ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate, Dexmethyphenidate, Lisdexamfetamine, Other: Modafinil, Adrafinil, Phenylpiracetam	Who misuses?: 11% of those surveyed misused in past year; they were more likely to be White and female (p .01). Why?: The number of study strategies significantly and positively predicted prescription stimulant misuse (p .06) The number of "effective" study strategies significantly and positively predicted misuse (p .03). Those who misused were more likely to use ineffective study strategies of rereading (p=.01), and recopying notes (p .04). How acquired?: NR How frequent?: Mean days used in past month: Adderall 2.80 (5.90), Ritalin 0.63 (2.76), Vyvanse 3.43 (8.91). Mode of administration: NR	Health: NR Psychological: NR Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Unclear, no comparison with larger population Was the response rate adequate, and if not, was the low response rate managed appropriately? Unclear, not reported

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
Holt, 2020 ³³ Data source: 3 universities Region: Multiple Setting: College(s) / university (ies) Study size: n = 1507	Population Mean age (SD): 19.48 (2.30), Min age: NR, Max age: NR % Hispanic or Latino: 22 % Black/African American: 8 % White: 57 % Asian: 4 % Multiracial: 9 % Female: 71 ADHD Medications Not specified	Who misuses?: 19% used stimulants non-medically at some point in college, 22% were classified as at-risk non-users according to the Behaviors, Expectancies, Attitudes and College Health Questionnaire (BEACH-Q) and 58% were classified as low risk non-users. A greater percentage of males (p .001), senior students (p .001), students from the Northeast site (p .001), and students with Greek affiliation (p .001) were non medical users. At risk non-users endorsed a similar level of ADHD symptoms compared to non-medical users; both groups reported more symptomatology than low-risk non-users (p .001)] Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR	Health: NR Psychological: NR Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: No Was the response rate adequate, and if not, was the low response rate managed appropriately? Unclear
Holt, 2020 ³² Data source: Amazon Mechanical Turks Region: National Setting: Other Study size: n = 219 college graduates - graduation year 1972 to 2018	Population Mean age (SD): 32.5 (7.12), Min age: NR, Max age: NR Other age information: Age range not reported; only 5% graduated college before 2000 % Hispanic or Latino: 3 % Black/African American: 3 % White: 82 % Asian: 4 % Multiracial: 8 % Female: 44	Who misuses?: 55% misused prescription stimulants after college. Significantly associated with past year misuse in ordinal regression model: Younger age (p .001), sensation seeking (p .007), norms (p .001), positive beliefs about stimulants (p .001), and workplace workload (p .008). Why?: Post college misuse: focus on work 69%, perform better on work tasks 56%, socialize better 29%, feel more energetic 65%, lose weight 26%, get high 34%.	Health: NR Psychological: NR Polysubstance use: Those who misused in past year were significantly more likely to use tobacco (p .011), cocaine (p .001), hallucinogens (p .039) and misuse prescription opiates (p .001) than those who misused over 1 year ago. Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: No table 1, subgroups do not have same response rate Was the response rate adequate, and if not, was the low response rate managed appropriately? Not applicable, respondents reacted to a post online

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
	ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate, Lisdexamfetamine	How acquired?: Post-college misuse: Obtained from prescriber 29%, given by friend or relative 66%, bought form friend or relative 49%, stole from friend or relative 5%, bought from stranger 19%, traded for another drug 9%. How frequent?: Of those with past month misuse (13%), 31% misused 1– 2 times, 45% 3–5 times, 14% 6–9 times, and 10% 10–19 times. Mode of administration: Mode of misuse while in college: oral 98%, intranasal 42%, other (e.g. smoking, injecting) 3%. Who misuses?: NR Why?: NR How acquired?: Researchers created 5 latent classes: Purchased from peer/Dealer 39.0%, Given by Friend 27.5%, Own Prescription 16.5%, Multiple Sources 13.2%, and Any Method 3.7%. How frequent?: NR Mode of administration: Not mutually exclusive: Swallow 84%, Snort 26%, Smoke 8%, Inject 0%.		
Holt, 2023 ³¹ Holm, 2022 ⁷⁶ Data source: 7 universities in 6 states: Colorado, New Mexico, New York, Virginia, Texas, and Wyoming Region: National Setting: College(s) / university (ies) Study size: n = 538 all misused in past year	Population Mean age (SD): 20.09 (2.74), Min age: NR, Max age: NR % Hispanic or Latino: 6 % Black/African American: 6 % White: 62 % Asian: 2 % Multiracial: 24 % Female: 32 ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate		Health: NR Psychological: Depression symptoms 50%, anxiety 63%, sleep problems 41%, anger 45%, suicidality 30%. Given by Friend class had the lowest prevalence of positive screening scores on all mental health outcomes. Compared to the Given by Friend class, the Multiple Sources group had higher odds of positive screening scores for depression (OR = 1.95, 95% CI = 1.05– 3.63), anger (2.01, 1.10– 3.64), anxiety (1.87, 1.02–3.45), and suicidality (2.63, 1.41–	Was the data analysis conducted with sufficient coverage of the identified sample?: Unclear, no comparison of respondents with larger population, only reflects psych students Was the response rate adequate, and if not, was the low response rate managed appropriately? Not applicable, not reported

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
			4.91). Compared to the Given by Friend class, the Own Prescription class had higher odds of positive screening scores for anger (2.42, 95% CI = 1.39–4.21), anxiety symptoms (OR = 4.78, 95% CI = 2.45–9.33), and suicidality (OR = 1.89, 95% CI = 1.05–3.41). Polysubstance use: Previous year: Opioids 22%, Benzodiazepines 28%, Sleeping medications 15%. Mean days past month marijuana use 11.71 (11.90). Mean days past month alcohol use 7.35 (6.50). As compared to the reference group (Given by Friend), those who misused their own prescription medication had lower prevalence of past 30-day marijuana use (p .028), simultaneous alcohol-marijuana use (p .011), rate of negative consequences (p .042) and lower odds of non-oral stimulant misuse (OR = 0.29, 95% CI = 0.14–0.58). The Peer/Dealer class had a	

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
			higher count of consequences than the Given by Friend class (p .001). Other: NR	
Ilieva, 2019 ³⁴ Data source: U Penn Region: Northeast Setting: College(s) / university (ies) Study size: n = 128 61 students who misused prescription stimulants, 67 controls who never used them	Population Mean age (SD): 20.95 (2.05), Min age: 18, Max age: 28 Race: NR % Female: 50 ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate	Who misuses?: NR Why?: NR How acquired?: NR How frequent?: Lifetime misuse: Never 52.3%, 1 occasion 3.9%, 2 occasions 1.6%, 3-5 occasions 14.1%, 6-9 occasions 6.3%, 10-19 occasions 11.7%, 20-39 occasions 7.0%, 40 or more occasions 3.1%. Mode of administration: NR	Health: NR Psychological: Compared to those who never used Rx stimulants, those who misused had significantly higher levels of depression (p 0.01), trait anxiety (p 0.01), and substance use (p 0.01) Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Unclear if participants were representative of wider population Was the response rate adequate, and if not, was the low response rate managed appropriately? Not applicable
Kennedy, 2015 ³⁵ Data source: Lackland Air Force Base - Emergency Dept Waiting Room Region: South Setting: Healthcare Study size: n = 498	Population Mean age (SD): 33.0 (10.7), Min age: 18, Max age: NR Race: NR % Female: 40 ADHD Medications Not specified	Who misuses?: Survey in military base emergency department; 5% misused Rx stimulants. Per regression analysis, misuse was significantly associated with previous deployment (p 0.05) and injury other than TBI (p 0.03); age, sex, rank, traumatic brain injury (TBI), and mental health diagnosis were not statistically associated with misuse. Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR	Health: NR Psychological: NR Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Unclear, no comparison with total base population Was the response rate adequate, and if not, was the low response rate managed appropriately? Yes, 99% response
LaBelle, 2023 ³⁶ Data source: Chapman University Region: West Coast	Population Mean age (SD): 19.65 (2.02), Min age: 18, Max age: 35 % Hispanic or Latino: 6.1	Who misuses?: The rate of misuse was not reported, nor were any descriptive statistics on those who misused. Why?: An increased intention to misuse prescription stimulants had a	Health: NR Psychological: NR Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: No high percentage of White participants

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
Setting: College(s) / university (ies) Study size: n = 147	% Black/African American: 2.7 % White: 62.6 % Asian: 21.2 Other: 4.1% identified as Middle Eastern, 2% as "Other" % Female: 56.5 ADHD Medications Not specified	small positive relationship with a more external academic locus of control ($r = .23$, $p = .003$) and a higher grade orientation ($r = .20$, $p = .03$), while entitlement ($r = .10$, $p > .05$). Actual past misuse was not related to academic locus of control ($r = .08$, $p > .05$), grade orientation ($r = -.02$, $p > .05$), or academic entitlement ($r = -.01$, $p > .05$). How acquired?: NR How frequent?: NR Mode of administration: NR		Was the response rate adequate, and if not, was the low response rate managed appropriately? No
Lueck, 2020 ³⁷ Data source: Texas A&M University Region: South Setting: College(s) / university (ies) Study size: n = 312 Study 2	Population Mean age (SD): 20.21 (1.48), Min age: 18, Max age: 28 % White: 76 % Female: 76 ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate	Who misuses?: This study assessed intention and attitudes toward misuse, rather than actual misuse. Why?: For behavioral beliefs, only the expectation of improved productivity (e.g., better/longer ability to focus, better grades) was correlated with intent to misuse ($r = .33$, $p = .001$). Perceptions of negative side effects (e.g., addiction, "coming down," etc.) (r $= -.09$, $p = .106$) and engaging in illegal/unethical behavior ($r = -.11$, p $= .056$) were not associated with intention. Perceptions of approval from friends and peers ($r = .31$, $p = .001$) most strongly influenced intentions, whereas important people with a strong sense of integrity ($r = .30$, p $= .001$), and authority figures (e.g., parents, professors, etc.) ($r = .19$, p $= .001$) did so to a lesser extent. Intentions were strongly associated with beliefs about one's capability to	Health: NR Psychological: There was a significant association between intentions to misuse and anxiety ($r =$ $.15$, $p = .01$), depression ($r = .13$, $p = .02$), stress (r $= .14$, $p = .02$), and perfectionism ($r = .12$, $p =$ $.04$). Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: No Was the response rate adequate, and if not, was the low response rate managed appropriately? No

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
		engage in misuse when one had access to them (e.g., knowing ‘dealers,’ being able to afford it financially) ($r = .43$, $p .001$), but also participants’ perception of peer pressure ($r = .21$, $p .001$) and perceptions of not having to worry about potential negative side effects and other health risks ($r = .40$, $p .001$); the expectation of improved productivity (e.g., better/longer ability to focus, better grades) ($r = .28$, $p .001$), and perceptions of approval from friends and peers ($r = .21$, $p .001$). How acquired?: NR How frequent?: NR Mode of administration: NR		
Macmadu, 2023 ³⁸ Data source: Rhode Island Prescription Drug Monitoring Program (PDMP) and the Office of the State Medical Examiner (OSME) Region: Northeast Setting: Other: Rhode Island Prescription Drug Monitoring Program Study size: $n = 894$	Population Mean age (SD): 40.7 (14.2) % White: 77 Other: 10% % Female: 28 ADHD Medications Not specified	Who misuses?: NR Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR	Health: 4% of accidental fatal drug overdoses between May 2017 and May 2020 involved a prescription psychostimulant. 31% ($N = 12$) of those individuals received a prescription psychostimulant within one year of death. Psychological: NR Polysubstance use: Of all Rhode Island accidental fatal overdoses where Rx amphetamines or methylphenidates contributed to the cause of death ($N = 39$): 90% involved opioids, 33%	Was the data analysis conducted with sufficient coverage of the identified sample?: Not applicable Was the response rate adequate, and if not, was the low response rate managed appropriately? Not applicable

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
			involved cocaine, 18% involved benzodiazepines. Other: NR	
McHugh, 2024 ³⁹ Data source: NSDUH 2015-2019 Region: National Setting: Community Study size: n = 282768	Population Mean age (SD): NR, Min age: 12, Max age: NR Race: NR % Female: NR ADHD Medications Not specified	Who misuses?: Per multivariate regression analyses, men had 1.37 times higher odds of past-year misuse (p .001); no sex difference was observed in the prevalence of prescription stimulant-use disorder (about 0.2% for both). No significant interaction of sexual orientation. Past year stimulant misuse was highest (7.6%) among men aged 18- 25. Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR	Health: NR Psychological: NR Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes, logistic regression models controlling for sociodemographic variables previously associated with stimulant misuse, including age, race, ethnicity, income, and access to health insurance Was the response rate adequate, and if not, was the low response rate managed appropriately? Yes
McNiel, 2011 ⁴⁰ Data source: dental schools in Texas Region: South Setting: College(s) / university (ies) Study size: n = 243 301 surveys returned; 243 contained usable data	Population Mean age (SD):, Min age: 18, Max age: Other age information: 18-20= 0.8%, 21-23= 17%, 24- 26= 43%, 27-30= 25%, 30+=15% % Hispanic or Latino: 10 % Black/African American: 4 % White: 68 % Asian: 17 Other: 1.2% % Female: 69 ADHD Medications	Who misuses?: 12.4% of the students used a prescription stimulant nonmedically; 10% of Dental and 18% of Dental Hygiene students Why?: Primary reason - to improve attention/concentration: 70%, for recreation: 17%, for higher grades: 13%. College was the most frequently reported time when stimulant medication misuse began (90%), followed by grade school (7 %) and high school (3%). How acquired?: 87% obtained through friends, 7% through parents/family members, 7% through physicians	Health: NR Psychological: NR Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Unclear, no comparison of respondents with target population Was the response rate adequate, and if not, was the low response rate managed appropriately? No, 61% responded, 75% required by power calc

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
	Amphetamine and dextroamphetamine, Methylphenidate, Dexamethylphenidate, Dextroamphetamine, Other: cyleert, strattera	How frequent?: 2-3 times per year: 83%, 1-2 times per month: 13%, 1-2 times per day: 4% Most commonly used nonmedically: Adderall: 77%, Ritalin: 17%, Concerta: 3%, Other / not specified: 3% Mode of administration: Oral: 93%, Snorting: 7%		
Mendez, 2023 ⁴¹ Figuerola, 2020 ⁷⁷ Data source: 2 California Universities Region: West Coast Setting: College(s) / university (ies) Study size: n = 1,035	Population Mean age (SD):22.8, Min age: 18, Max age: 67 % Hispanic or Latino: 22.58 % White: 38.71 % Asian: 25 Other: 13.71% identified as either African American, Biracial/Multiracial, Other, or they declined to answer or stated their racial/ethnic background was unknown % Female: NR ADHD Medications Not specified	Who misuses?: 24.8% reported misuse in lifetime. Regression analyses examining frequency of misuse by race/ethnicity showed no significant difference for Asian students compared to White students (p .05); and no significant differences in frequency for Latinx/ Hispanic students compared to White students (p .05). There were too few Black students to conduct this analysis. Why?: NR How acquired?: For White students, there was a 0.8 unit increase in MPS frequency if students reported paying (versus not paying) \$1-\$5 per pill. In addition, paying \$6–10 per pill was associated with increased frequency among students identifying as White (p<0.01) and Latinx (p<0.05). For Latinx students, there was a 1.25 unit increase in MPS frequency if students reported paying (versus not paying) \$6-\$10 per pill; for students identifying as White, the unit increase was 1.71. How frequent?: Of those who misused in lifetime: never during college 16.73%, 1–2 times 30.35%, 3–5 times 18.29%, 6–9 times 8.56%, 10–19	Health: NR Psychological: NR Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes 92.6% response Was the response rate adequate, and if not, was the low response rate managed appropriately? Yes 92.6% response rate

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
		times 3.11%, 20–39 times 1.95%, 40 or more times 2.72%. The internet as a source was associated with greater misuse frequency for students identifying as White (p 0.01) and Asian (p 0.01). Identifying 'self' as a source was associated with increased MPS frequency only for students identifying as White (p<0.01). Mode of administration: For each racial/ethnic category, oral ingestion was associated with increased frequency. Intranasal ingestion was significantly associated with increased frequency for Latinx (p .05). Intravenous ingestion was significantly associated with increased frequency only for White students (p 0.01).		
Mineo, 2017⁴² Data source: New York College of Podiatry Medicine Region: Northeast Setting: College(s) / university (ies) Study size: n = 303	Population Mean age (SD): 26.9 (2.3), Min age: 22, Max age: 30 % Hispanic or Latino: 6.9 % Black/African American: 5.3 % White: 50.2 % Asian: 35.3 % Multiracial: 2.3 % Female: 44.2 ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate	Who misuses?: 32% of podiatry students misused ADHD medications; in logistic regression, age, sex, race/ethnicity, GPA, and marital status were not significantly associated with misuse; those who belonged to student-run special interest organizations/clubs were more likely to misuse (p .02). Use of illicit drugs (p .001) and being hyperthymic (p .0003) were also significantly associated with misuse. Why?: Increase ability to stay alert during studying 86.3%, allow studying for longer period of time 13.7%. How acquired?: NR How frequent?: Adderall/AdderallXR, times used in past year: 1–2 times 6%, 3–5 times 7.3%, 6–9 times 2.5%,	Health: NR Psychological: NR Polysubstance use: Students who used illicit drugs had 2.3 higher odds of misuse of stimulants. Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes, 86.5% response, questionnaire administered in class Was the response rate adequate, and if not, was the low response rate managed appropriately? Yes, response rate was 86.5%

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
		10–19 times 4.2%, 20–39 times 2.2%, ≥40 times 1.6%. Ritalin/Concerta 1–2 times 3.9% Mode of administration: NR		
Mochrie, 2020 ⁴³ Data source: East Carolina University, Department of Psychology Region: South Setting: College(s) / university (ies) Study size: n = 1,748	Population Mean age (SD): 18.51 (.74), Min age: 18, Max age: 25 % White: 71.3 % Female: 68.4 ADHD Medications Not specified	Who misuses?: 11.3% of incoming students had an ADHD diagnosis. Non-prescribed prescription stimulant use (once or more in past year): with ADHD diagnosis 14.3%, without ADHD diagnosis 8.0%. Among students with ADHD, those using prescriptions used other substances at similar rates to those without medication. Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR	Health: NR Psychological: NR Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: No, no comparison of respondents vs non-respondents Was the response rate adequate, and if not, was the low response rate managed appropriately? Unclear, response rate not reported
Molina, 2020 ⁴⁴ Data source: ADHD patients from 6 clinics Region: Northeast Setting: Healthcare Study size: n = 114	Population Mean age (SD): 20.4 (1.6), Min age: 18, Max age: 25 % Hispanic or Latino: 4.4 % White: 95.6 % Multiracial: 3.5 % Female: 47.4 ADHD Medications Not specified	Who misuses?: Study investigated diversion among ADHD patients aged 18 to 25 and implemented a primary care prevention intervention. Diversion was infrequent with 16.7% and 14.9% diverting at Times 1 and 2; post- intervention reduction was not statistically significant. Why?: 75.0% diverted for cognitive performance (studying) and 18.8% diverted for recreational purposes (partying), one person diverted for studying and for partying. Mean times diverting in past year was 1.79 (SD=1.27), range=1-6. How acquired?: NR How frequent?: NR Mode of administration: NR	Health: NR Psychological: NR Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: No Was the response rate adequate, and if not, was the low response rate managed appropriately? Unclear

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
Nayfa, 2020 ⁴⁵ Data source: Mississippi State University Region: South Setting: College(s) / university (ies) Study size: n = 480	Population Mean age (SD): 19.23 (1.30), Min age: NR, Max age: NR % Black/African American: 50 % White: 50 % Female: 50 ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate, Lisdexamfetamine	Who misuses?: NR Why?: Compared to White participants, Black participants were less likely to perceive an increase in concentration ($p < .001$), an increase in alertness ($p < .001$), and a benefit of help with studying ($p < .001$). How acquired?: NR How frequent?: NR Mode of administration: NR	Health: NR Psychological: NR Polysubstance use: NR Other: Risk Perceptions of Misuse Black participants perceived higher social risk than White participants ($p < .001$).	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes Was the response rate adequate, and if not, was the low response rate managed appropriately? Not applicable
Novak, 2007 ⁴⁶ Data source: Harris Poll Region: National Setting: Community Study size: n = 4297	Population Mean age (SD): NR Min age: 18, Max age: 49 Other age information: 77% aged 18 - 25 % Hispanic or Latino: 8.63 % Black/African American: 6.47 % White: 77.7 % Female: 56.8 ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate, Dexmethylphenidate	Who misuses?: 7.1% lifetime misuse, 2% past year Past year prevalence higher in age 18–25 (4.34%) than 26–49 (1.27%) Why?: Be more productive 39.8%, Stay awake 23.1%, Get high/ feel good 13.0%, Relax 10.4%, Fun 5.0%, To drink more alcohol 1.0% How acquired?: Given by friend/ family member 65.8%, purchased from friend / family 13.0%, Stolen 34.5%, Fraudulently from a doctor 19.8%, Internet pharmacy 5.3% How frequent?: Past year: 30% misused 1 or 2 days , 70% misused 3 or more days Mode of administration: NR	Health: NR Psychological: NR Polysubstance use: Past year, used “at same time or within couple hours.” Alcohol 52.8%, Marijuana 26.2%, Cocaine 19.8%, Heroin 6.4%, Other Rx 19.5%, Hallucinogens 3.6%, Any substance 67.9% Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: No Was the response rate adequate, and if not, was the low response rate managed appropriately? Yes
Nutley, 2020 ⁴⁷ Data source: 127 colleges & universities Region: National	Population Mean age (SD): NR, Min age: 18, Max age: 31+ Other age information: 18-22 yrs:	Who misuses?: 2.8% of students reported prescription stimulant misuse in past year. In bivariate analyses, misuse was significantly associated with being female , White, younger, being undergraduate (compared to	Health: NR Psychological: Among those who misused: reported anxiety symptoms 37.9%, lifetime history of depression	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes Was the response rate adequate, and if not, was the low response rate

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
Setting: Community Study size: n = 87296	77.3%, 23-30 yrs: 19.8%, 31+ yrs: 2.9% % Hispanic or Latino: 3.7 % Black/African American: 2.4 % White: 72.6 % Asian: 5.5 % Multiracial: 15.9 % Female: 60.5 ADHD Medications Not specified	grad students), having lower GPA, and being a sorority or fraternity member (all p .001). However, multivariate regression analysis was not conducted. Why?: 34% of those who misused report disordered eating behaviors. Specific behaviors include: Making oneself sick after eating (24.0%), Worrying about losing control over eating (38.4%), Recent significant weight loss (13.8%). How acquired?: NR How frequent?: NR Mode of administration: NR	28.0%, life time history of anxiety 30.6%. Polysubstance use: Adults who misused prescription stimulants reported high rates of tobacco use (40.6%), marijuana use (73.5%) and substance use disorders (4.0%). Other: NR	managed appropriately? Yes, weighted for nonresponse
Pakdaman, 2021 ⁴⁸ Schepis, 2020 ⁷⁸ Data source: Large diverse California university Region: West Coast Setting: College(s) / university (ies), Community Study size: n = 3899	Population Mean age (SD): 24.55 (7.651), Min age: NR, Max age: NR % Hispanic or Latino: 55.4 % White: 27.9 % Asian: 16.7 % Female: 69.9 ADHD Medications Amphetamine and dextroamphetamine	Who misuses?: Study of misuse of several types of prescription drugs; misuse rate not reported for each drug. In regression model, stimulant misuse was significantly associated with adverse childhood experiences (ACE), with an increase in adjusted odds of stimulant misuse with each additional ACE among students identifying as Asian/Pacific Islander (API) and Hispanic, but not Whites. Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR	Health: NR Psychological: NR Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes Was the response rate adequate, and if not, was the low response rate managed appropriately? Yes, Black, Native American, and Multiracial sample too small, so analysis limited to Hispanic, Asian/PI, and White
Patrick, 2024 ⁴⁹ Data source: Monitoring the Future Region: National Setting: Community	Population Mean age (SD): NR, Min age: NR, Max age: NR Race: NR	Who misuses?: Among ages 19 to 30, past year misuse of Adderall dropped from 7.8% in 2022 to 3.7% in 2023 (p .001); Ritalin dropped from 1.5% to 1.2% (not statistically significant).	Health: NR Psychological: NR Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes Was the response rate adequate, and if not, was the low response rate

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
Study size: n = 10519	% Female: NR ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate	Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR		managed appropriately? Yes about 35%, but weights adjust for attrition / non-response
Pham, 2017 ⁵⁰ Data source: Region: Northeast Setting: Other: Community - class for parents of ADHD children Study size: n = 180 180 parents of children treated with stimulant medication; 32 respondents reported that a spouse had also completed the survey so the sample represents 164 unique households	Population Mean age (SD): NR, Min age: NR, Max age: NR % Hispanic or Latino: 5 % Black/African American: 2 % White: 88 % Asian: 2 % Multiracial: 2 % Female: 81 ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate	Who misuses?: Of 180 parents of children prescribed ADHD stimulant medication, 16% reported that one or more forms of household diversion had ever occurred. 11% admitted to having tried their child's medication themselves and 5% responded that another adult in the household had used. Why?: Among parents using their child's meds, 45% were self- medicating for suspected or diagnosed ADHD, 20% were curious if they could get a "high or good feeling" and 1 "needed to get a lot of work done." How acquired?: Study only asked about whether parents ever took their children's medications; 16% of 180 parents attending a seminar for parents of children with ADHD did at least once. How frequent?: Lifetime: 1-3 times 75%, 4 -10 times 25%; no parents took over 10 times. Mode of administration: NR	Health: NR Psychological: NR Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes Was the response rate adequate, and if not, was the low response rate managed appropriately? Yes, 80%
Philbin, 2020 ⁵¹ Data source: NSDUH 2015–2017 Region: National	Population Mean age (SD): NR, Min age: 18, Max age: NR Other age information: 18–25:	Who misuses?: Lesbian, gay, and bisexual individuals had uniformly higher stimulant use than their heterosexual peers (p .001). Why?: NR	Health: NR Psychological: NR Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes Was the response rate adequate, and if not, was the low response rate

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
Setting: Community Study size: n = 126,463	14.2%, 26-34: 15.9%, 35-49: 24.7%, ≥50: 45.2% % Hispanic or Latino: 15.6 % Black/African American: 11.8 % White: 64.8 % Female: 51.6 ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate, Dextroamphetamine	How acquired?: NR How frequent?: NR Mode of administration: NR		managed appropriately? Yes, 66.3% to 68.4%, adequately managed
Rockhill, 2023 ³² Data source: Researched Abuse, Diversion and Addiction-Related Surveillance System's Survey of the Nonmedical Use of Prescription Drugs (NMURx) program Region: National Setting: Community Study size: n = 8210	Population Mean age (SD): NR, Min age: 18, Max age: NR Race: NR % Female: NR ADHD Medications Not specified	Who misuses?: National prevalence of nonmedical use of prescription stimulants in past year was 1.9% (95% CI 1.8%-2.0%), including amphetamine (1.6%, 95% CI 1.5%- 1.6%), methylphenidate (0.3%, 95% CI 0.3%-0.4%), and modafinil (0.2%, 95% CI 0.2%-0.3%). Why?: Reason for Nonmedical Use (not mutually exclusive): To focus or get work done: 62.8%, to stay awake or be alert: 59.6%, for enjoyment and to get high: 35.2%. In Latent Class Analysis, 5 distinct latent classes emerged, indicating that there is no one dominant use pattern. An amphetamine "self-medication" class largely used the drug to treat medical symptoms and therefore could represent a group of individuals with untreated or undertreated ADHD because less than half of that subgroup reported an ADHD	Health: NR Psychological: NR Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes Was the response rate adequate, and if not, was the low response rate managed appropriately? Not applicable

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
		diagnosis. An “alertness” class demonstrated that such use is not confined to college students - predominately female (61%), had lower diagnoses of ADHD, and obtained medications almost exclusively through friends or family, with low risk. “Performance” class are predominately using nonamphetamine drugs such as methylphenidate and modafinil; they have a higher-risk behavioral profile, including routes that involve tampering, such as inhalation or chewing of medications, and sourcing through diversion. How acquired?: Source of misused stimulant: Friend or family member: 55.4%, Own valid prescription: 41.5% How frequent?: NR Mode of administration: NR		
SAMHSA, 2013 ³⁹ Mattson, 2013 ² Data source: DAWN Region: National Setting: Healthcare Study size: n = 15585	Population Mean age (SD): NR, Min age: NR, Max age: NR Other age information: ED visits for prescription stimulants, 2010: under 18: 23.2%, 18-25: 26.1%, 26-34: 19.5%, 35+: 25.5% Race: NR % Female: 45.0 ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate,	Who misuses?: See second column of this table for sex and age info for 2010 ED visits involving ADHD prescription stimulants (at least half were non medical use). Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR	Health: NR Psychological: NR Polysubstance use: Relevant ED visits from 2005 to 2010: ADHD Stimulant Medication Only 37%, ADHD Stimulant Medication with One Other Drug 25%, ADHD Stimulant Medication with Two or More Other Drugs: 38%. Other drugs involved: Marijuana: 14%, Cocaine: 4% Heroin: 3%, Alcohol: 19%, Anti- anxiety and Insomnia	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes Was the response rate adequate, and if not, was the low response rate managed appropriately? Yes

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
	Dexamethylphenidate, Dextroamphetamine		Medications: 26%, Narcotic Pain Relievers: 16%, Antidepressants: 10%, Antipsychotics: 7%, Cardiovascular Agents: 6%, Anticonvulsants: 4%, Respiratory Agents 3%. Other: NR	
SAMHSA, 2024 ⁵⁷ SAMHSA, 2023 ⁷⁹ Data source: NSDUH 2023 Region: National Setting: Community Study size: n = 67679	Population Mean age (SD): NR, Min age: 12, Max age: NR Race: NR % Female: NR ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate	Who misuses?: Past year misuse: aged 18 to 25 3.1% (1.1 million people), aged 26 or older 1.2% (2.6 million people). By race/ ethnicity, US population aged 12 or older: White 1.7%, Hispanic 0.9%, Asian 0.8%, Black 0.8%, Native Hawaiian / Pacific Islander 0.4%. Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR	Health: NR Psychological: NR Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes Was the response rate adequate, and if not, was the low response rate managed appropriately? Yes, weighted for nonresponse
SAMHSA, 2024 ⁵⁸ Data source: Treatment Episode Data Set (TEDS) Region: National Setting: Healthcare Study size: n = about 1.5 million Drug Treatment Admissions (persons could have more than 1 admission per year)	Population Mean age (SD): NR, Min age: NR, Max age: NR Other age information: 21-34: 37.1%, 35-44: 28.3%, 45-54: 16.4%, 55-64: 11.3%, 65+: 2.2% % Hispanic or Latino: 15.2 % Black/African American: 20.0 % White: 65.0 % Asian: 0.7 Other: 9.5%	Who misuses?: NR Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR Who misuses?: NR Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR	Health: NR Psychological: NR Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes Was the response rate adequate, and if not, was the low response rate managed appropriately? Not applicable, entire population

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
	% Female: 34.6 ADHD Medications Methylphenidate			
Schepis, 2022 ⁵³ Data source: NSDUH Region: National Setting: Community Study size: n = 69916	Population Mean age (SD): NR, Min age: 18, Max age: 25 % Hispanic or Latino: 22.0 % Black/African American: 14.1 % White: 54.2 % Female: 49.8 ADHD Medications Not specified	Who misuses?: Past-Month Stimulant Prescription Drug Misuse): Overall 2.0%, White 2.9%, Black 0.6%, Hispanic/Latino 0.9% Why?: NR How acquired?: NR How frequent?: Past month misuse 2% of population, Past month simultaneous prescription drug misuse -alcohol co-ingestion 0.8%, Mean days of use, past month: 4.55 Mode of administration: NR	Health: NR Psychological: In regression model, significantly associated with past month prescription stimulant misuse (OR, CI): past- year multiple SUDs 14.55 (11.45-18.50), Past-year Mental Health Treatment 1.66 (1.35-2.04), Past- year Major Depression 2.07 (1.62-2.65), Past- year Serious Psychological Distress 2.14 (1.75-2.61), Past- year Suicidal Ideation 1.85 (1.47-2.32) Polysubstance use: In regression analysis, significantly associated with past-month prescription stimulant misuse without Alcohol Co-Ingestion , Odds ratio (CI): Past-month Binge Alcohol Use 5.23 (4.10- 6.67), Past-month Marijuana Use 8.26 (6.78-10.05), Past month nicotine dependence 3.07 (2.30-4.11), Past month other illicit drug 12.81 (10.77-15.24),	Was the data analysis conducted with sufficient coverage of the identified sample?: No, high % of White participants Was the response rate adequate, and if not, was the low response rate managed appropriately? Yes

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
			Past-year any DSM-IV Substance Use Disorder 8.33 (7.06-9.81) Other: NR	
Sembower, 2013 ⁵⁴ Data source: Researched Abuse, Diversion and Addiction-Related Surveillance (RADARS) System Drug Diversion Program and Poison Center Program Region: National Setting: Community Study size: n = approximately 36,000 to 38,000 randomly selected stores	Population Mean age (SD): NR, Min age: NR, Max age: NR Race: NR % Female: NR ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate, Dexmethylphenidate, Lisdexamfetamine	Who misuses?: Over the 4 years, prescriptions for extended-release amphetamine increased 87.7%, those for extended-release oral methylphenidate increased 11.3%. (Data not specific to adults.) Why?: NR How acquired?: Between Q3/2007 to Q2/2011, diversion of oral extended release MPH increased from 0.022 to 0.045 and diversion of extended release amphetamines increased from 0.035 to 0.048 per 1,000 unique recipients of a dispensed drug (URDD). Both increased were statistically significant. How frequent?: NR Mode of administration: NR	Health: NR Psychological: NR Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes Was the response rate adequate, and if not, was the low response rate managed appropriately? Not applicable, administrative records
Shearer, 2022 ⁵⁵ Data source: NSDUH 2015-2020 Region: National Setting: Community Study size: n = 7685 who misused prescription stimulants in past year	Population Mean age (SD): NR, Min age: 18, Max age: NR Other age information: 18-25: 45.8%, 26-34: 30.4%, 35-49: 17.2%, 50+: 6.6% % Hispanic or Latino: 11.6 % Black/African American: 4.7 % White: 77.2 Other: 6.5	Who misuses?: Estimated 2.0% of US adults misuse ADHD prescription stimulants each year. Individuals who misused prescription stimulants were more likely to be white, 18 to 25 years old, have private insurance, and incomes above 200 % of the federal poverty line. Rates of unstable housing and CLI did not differ among individuals who misused prescription stimulants (6.6 % (95 % CI: 5.8–7.5) and 11.1 % (95 % CI: 10.0–12.3)). Why?: NR	Health: NR Psychological: NR Polysubstance use: Among those misusing ADHD prescription stimulants in past year: Used cocaine 12.0% (CI 11.0-12.9), Used methamphetamine: 2.4% (CI 1.9-3.0), Used heroin 0.6% (0.4-0.7), Misused prescription opioids: 29% Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes, sample weights provided by NSDUH Was the response rate adequate, and if not, was the low response rate managed appropriately? Yes

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
	% Female: 43.7 ADHD Medications Not specified	How acquired?: NR How frequent?: NR Mode of administration: NR		
Simon, 2024 ⁵⁶ Data source: University of Arkansas Region: South Setting: College(s) / university (ies) Study size: n = 384	Population Mean age (SD): 23.16 (5.06), Min age: 18, Max age: NR % Hispanic or Latino: 8.1 % Black/African American: 7.3 % White: 49.5 % Asian: 5.2 % Multiracial: 1.0 Other: 0.8% other % Female: 49.5; other sex 0.8% ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate, Dextroamphetamine, Lisdexamfetamine	Who misuses?: 29.7% reported prescription stimulant NMU in lifetime. In logistic regression, the following were significantly associated with NMU: Age OR 1.09 (1.04, 1.14), Sexual minority 5.56 (3.30, 9.34), year in school (compared to Freshmen) - Sophomore 3.93 (1.93, 8.06), Junior 8.42 (3.77, 18.78), Senior 6.17 (2.85, 13.37), Graduate student 7.38 (3.29, 16.54), lower GPA (compared to 3.50 or higher) - 2.00 - 2.49 GPA 3.87 (1.71, 8.76), 2.50 - 2.90 GPA 2.90 (1.41, 5.96), 3.00 - 3.49 GPA 2.38 (1.29, 4.39), Being employed 1.72 (1.08, 2.75). Living status (off-campus) was associated with lower risk 0.48 (0.30, 0.76). Why?: Not mutually exclusive: Improve test performance 34.21%, Improve focus in class 40.35%, Improve intellectual performance 36.84%, Improve study skills 38.60%, Improve concentration 45.61%, Curiosity or experimentation 25.44%, Lose weight 23.68%, Get high 22.81%, Stay awake 35.09%, Prolong partying 16.67%, Intensify effects of drugs or alcohol 16.67%, Be more social 20.18%, Relax and forget worries 23.68% How acquired?: Not mutually exclusive: Drug dealer 4.55%, Friends	Health: NR Psychological: In a logistic regression analysis, stimulant NMU was significantly associated with: Suicidal ideation 6.47 (3.87, 10.83), Depression 3.28 (2.01, 5.35), and Anxiety 3.58 (2.21, 5.81). Polysubstance use: In a logistic regression analysis, stimulant NMU was significantly associated with: Harmful alcohol use OR 3.62 (CI 1.86, 7.05), Marijuana use 7.66 (4.50, 13.05), Other prescription drug misuse 22.65 (11.47, 44.74), Illicit drug use 17.91 (9.48, 33.85), and Nicotine products 4.48 (2.67, 7.51). Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Unclear, “demographics were fairly consistent with overall University student characteristics” but 49.5% of respondents were White, compared to 70% of university students total Was the response rate adequate, and if not, was the low response rate managed appropriately? Unclear, not reported

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
		43.64%, Relatives 9.09%, Doctor's prescription 28.18%, Emergency room 1.82%, Theft 0.91%, Forged prescription 0.91%, Internet 4.55%, Other 6.36%. 52.7% of those with their own prescription reported diverting their medication. Reasons for diversion included to help person who needed or wanted it 58.62%, pressure from person who needed or wanted 41.38%, and to make money 10.34% How frequent?: NR Mode of administration: NR		
Summit, 2023⁶⁰ Data source: University of North Carolina, Wilmington Region: South Setting: College(s) / university (ies) Study size: n = 148	Population Mean age (SD): 19.18 (1.30), Min age: 18, Max age: 28 % White: 83.1 % Female: 75; Other sex information: 0.7% identified as other ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate	Who misuses?: 12.2% reported misuse at least once in past 3 months. The purpose of this study was to assess students' views on misuse by measuring reactions to two written vignettes using standardized questionnaires. Sex did not influence students' views on non-medical use; they viewed academic use less negatively than recreational use. Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR	Health: NR Psychological: NR Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: No Was the response rate adequate, and if not, was the low response rate managed appropriately? Unclear
Thorton, 2023⁶¹ Data source: Central Michigan University Region: Midwest Setting: College(s) / university (ies) Study size: n = 212	Population Mean age (SD): 18.9, Min age: 18, Max age: 27 % White: 85.8 % Female: 50.9 ADHD Medications	Who misuses?: 25.5% reported using prescription stimulants for nonmedical purposes Why?: 16.5% has used prescription stimulants at parties, 27.8% to focus better in class, 25.5% to perform better on tests, 7.1% to help them socialize, 4.2% to lose weight, 27.4%	Health: NR Psychological: NR Polysubstance use: Participants reported consuming on average more than 4 drinks per week, 17.9% has used	Was the data analysis conducted with sufficient coverage of the identified sample?: Unclear; No comparison with full undergraduate population Was the response rate adequate, and if not, was the low response rate managed appropriately? Not applicable,

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
	Amphetamine and dextroamphetamine, Methylphenidate, Lisdexamfetamine	to perform better in schoolwork, 17.5% to feel energetic, 2.4% to feel better about themselves, 10.8% to “get high.” How acquired?: 47.6% has been offered prescription stimulants by other students, 26.4% tried someone else’s prescription, 16.5% purchased from other students, 4.7% sold to other students, 12.7% gave to other students. How frequent?: NR Mode of administration: 14.2% had snorted.	prescription stimulants with alcohol Other: NR	posted online, only interested parties responded, no refusal rate
Torre, 2020 ⁶² Data source: SDSU Region: West Coast Setting: College(s) / university (ies) Study size: n = 243	Population Mean age (SD): 20.9 (2.7), Min age: 18, Max age: 30 Race: NR % Female: 74.9 ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate	Who misuses?: Of 243 college students recruited for a hearing study, 18.1% reported ever using stimulant medications without a prescription or in a way other than as prescribed. Sex differences were not significant. Why?: NR How acquired?: How frequent?: 9.9% of participants reported misusing stimulant medication in the past 30 days. Mode of administration: NR	Health: NR Psychological: NR Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: No Was the response rate adequate, and if not, was the low response rate managed appropriately? Unclear
Tuttle, 2010 ⁶³ Data source: University of Kentucky Medical School Region: South Setting: College(s) / university (ies) Study size: n = 388	Population Mean age (SD): NR, Min age: NR, Max age: NR % Black/African American: 3.7 % White: 87 Other: 9.8% % Female: 44.0 ADHD Medications	Who misuses?: Per survey of all medical students, 10% reported any lifetime misuse. History of nonmedical prescription stimulant statistically associated with being White (p 0.041). Why?: Improve academic performance: 58%). Other reasons included increasing alertness and concentration for nonacademic purposes, countering the effects of	Health: NR Psychological: NR Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes Was the response rate adequate, and if not, was the low response rate managed appropriately? Yes, 84% response rate

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
	Not specified	other drugs of abuse, and experimentation (% not reported). How acquired?: 70% obtained from peers. How frequent?: Of those with a lifetime history: 5 or more times 39%, 2-5 times 45%, only once 15%; 48% of those with lifetime history of misuse reported such use during medical school. Mode of administration: NR		
Verdi, 2016 ⁶⁴ Data source: 5 unnamed graduate schools throughout US Region: Multiple Setting: College(s) / university (ies) Study size: n = 854 807 used, 33 students (3.7% of total respondents) reported currently taking stimulant medication as prescribed by a health care provider, and were excluded from the sample. An additional 14 students provided consent but did not complete sufficient ite	Population Mean age (SD): NR, Min age: NR, Max age: NR Other age information: 22-29= 65.8% % Hispanic or Latino: 8.6 % Black/African American: 1.9 % White: 76.6 % Asian: 6.3 % Multiracial: 2.2 % Female: 72.1; Other sex information: 1.9% not disclosing sex ADHD Medications Not specified	Who misuses?: Overall, 5.9% of participants reported non-medical use of prescription stimulant use within the past year. Why?: The most frequently reported (16.2%) motivation among students who endorsed past non-medical use of stimulant medication was “to perform better in my schoolwork.” The second most frequently reported (12.3%) motivation for use was “to feel more energetic.” Furthermore, academic activities were the most frequently cited perceived motivation for the non-medical use of stimulants by peers, with 36% having reported knowing other students who use the medications “during tests,” with even higher numbers for the use of medications by peers “while studying” (43.8%) and “during finals week” (44.0%). Perceived social use among peers was also reported, with about 1 in 5 participants indicating that they knew students who use prescription stimulants “at parties”	Health: NR Psychological: NR Polysubstance use: Substantial proportions of students reported having used prescription stimulants “with alcohol” (10.7%), “at parties” (8.9%), “to help [them] socialize better” (7.4%), and “to get high” (7.8%). Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Unclear, response rate not reported, no comparison of respondents with entire sampling frame Was the response rate adequate, and if not, was the low response rate managed appropriately? Unclear, not reported

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
		(20.4%), “with alcohol” (22.1%), and “with other drugs” (18.9%). How acquired?: Substantial proportions of students reported having used prescription stimulants “with alcohol” (10.7%), “at parties” (8.9%), “to help [them] socialize better” (7.4%), and “to get high” (7.8%). How frequent?: NR Mode of administration: NR		
Vosburg, 2021⁶⁵ Data source: YouGov, but recruited from Reddit Region: National Setting: Other: Reddit Study size: n = 225	Population Mean age (SD): NR, Min age: 18, Max age: NR Other age information: 18-24= 48%, 25-34= 43.1 % % Hispanic or Latino: 5.3 % Black/African American: 7.1 % White: 78.2 Other: 9.3% other, 92.4% non-hispanic % Female: 13.8 ADHD Medications Not specified	Who misuses?: NR Why?: Performance enhancement at work/school 56.0 %, Get high 33.3%, Improve my mood or elevate my spirit 13.3%, For energy 11.6%, To enhance effect of other drugs 1.3%, To prevent or treat withdrawal symptoms 0.9%, To control appetite or for weight loss 0.0% How acquired?: Purchased from a family member or friend 72.1%, given by a family member or a friend 64.5%, stole from family member or friend 10.5%, bought from dealers 39.6%, prescription from MD 24.4%, bought online without having seen a doctor 5.3%. How frequent?: NR Mode of administration: Oral: 85%, Intranasal: 99%, Injection: 6%, Smoked 4% Why route chosen? The feeling or effect I want to get from using the medication or the reason you are using (to get high versus to enhance	Health: NR Psychological: NR Polysubstance use: Used Concurrently during Prescription Stimulant NMU: None/zero 20.9 %, 1 substance 19.1%, 2 or more substances 60.0%. Tobacco 57.3%, marijuana 52.0%, caffeine 47.6%, alcohol 41.8%, cocaine 15.1%, tranquilizers or sedatives 13.3%, prescription opioids 12.4%, methamphetamine 11.1%, heroin 4.9%, street fentanyl 2.7%. Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes Was the response rate adequate, and if not, was the low response rate managed appropriately? Not applicable Posted ad and link to survey on Reddit, so denominator unclear

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
		performance or for energy or treat withdrawal) 64.3%. The specific medication I have available 57.1 % Who I am with 35.7% Where I am using (such as home, school, work, or party) 35.7%. Intranasal (55.6%) or oral (63.0%) use was primarily endorsed as an attempt to enhance performance at work or at school; use by injection (57.1%) or smoking (62.5%) was primarily endorsed to get high.		
Wasserman, 2014 ⁶⁶ Data source: Kansas City University, College of Osteopathic Medicine Region: Midwest Setting: College(s) / university (ies) Study size: n = 369	Population Mean age (SD): NR, Min age: NR, Max age: NR Other age information: First-year students: 53.1%, second-year students: 46.9%; age not reported here to protect anonymity of older students Race: NR % Female: 39.3 ADHD Medications Not specified	Who misuses?: In a survey of all 1st and 2nd year osteopathic medical students, 22.2% reported using prescription stimulants nonmedically to help them study either during their undergraduate career (16.3%) or during medical school (15.2%). Why?: Stress showed no association with use. Using prescription stimulants nonmedically to study during medical school was associated with having a close friend or roommate who did same (p 0.05). How acquired?: NR How frequent?: NR Mode of administration: NR	Health: NR Psychological: NR Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes Was the response rate adequate, and if not, was the low response rate managed appropriately? Yes, 76.2% response rate, authors managed appropriately
Wei, 2023 ⁶⁷ Data source: FDA Adverse Event Reporting System (FAERS) Region: National Setting: Healthcare Study size: n = 15,073 15,073	Population Mean age (SD): NR, Min age: 19, Max age: NR Race: NR % Female: 26.21 ADHD Medications Methylphenidate	Who misuses?: NR Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR	Health: NR Psychological: Signals found for self destructive behavior (PRR = 1072.93) and suicidal ideation (PRR = 8.77). Polysubstance use: NR Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes Was the response rate adequate, and if not, was the low response rate managed appropriately? Not applicable

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
reports for methylphenidate and dexamethylphenidate, other drugs reported were nonstimulant (atomoxetine) and amphetamine (unclear classification)				
Willems, 2006 ⁶⁸ Data source: Region: Northeast Setting: Other: recruited at clinics 10 years prior Study size: n = 98	Population Mean age (SD): 20.9 (5.1), Min age: NR, Max age: NR % White: 100 % Female: 34 ADHD Medications Not specified	Who misuses?: Study compared young adults who were prescribed ADHD stimulants with siblings who were prescribed other psychotropics. Within past 4 years, of those prescribed ADHD stimulants: 22% misused, 10% “got high” on it. Why?: NR How acquired?: 11% diverted their ADHD stimulant medication. All ADHD subjects diverting their medication had either comorbid conduct disorder or SUD. How frequent?: NR Mode of administration: NR	Health: NR Psychological: NR Polysubstance use: Other medications prescribed to adolescents on ADHD meds: SSRIs 31%, tricyclic antidepressants 21%, a-adrenergic agents 15%, neuroleptics 6%, benzodiazepines 4%. 16% skipped ADHD meds to use alcohol or illicit drugs, 31% used them with alcohol or illicit drugs. Other: NR	Was the data analysis conducted with sufficient coverage of the identified sample?: Yes, all were included Was the response rate adequate, and if not, was the low response rate managed appropriately? Unclear, “data available for 98” unclear how many did not respond
Wong, 2022 ⁶⁹ Kerr, 2023 ⁸⁰ Data source: National College Health Assessment (NCHA) Region: National Setting: College(s) / university (ies) Study size: n = 40645	Population Mean age (SD): NR, Min age: 18, Max age: NR % Hispanic or Latino: 6.7 % Black/African American: 4.5 % White: 68.8 % Asian: 10.2 % Multiracial: 9.7	Who misuses?: 8% engaged in misuse in past 12 months. In a multivariate model, misuse was significantly associated with being in a fraternity or sorority (OR 1.72, 95% CI 1.52–1.95), being in third year 1.21 (1.05, 1.40), fourth year 1.23 (1.06, 1.43), and fifth year or higher 1.35 (1.03, 1.77) compared to students in their first year of college, and reporting academic difficulty (1.41, 1.27–1.58).	Health: NR Psychological: In a multivariate model, predictors associated with misuse included past-year diagnosis or treatment of depression 1.16 (1.01, 1.33), anorexia 1.44 (1.02, 2.03), ADHD 1.66 (1.41, 1.95), substance use	Was the data analysis conducted with sufficient coverage of the identified sample?: Unclear, high Prevalence of White participants Was the response rate adequate, and if not, was the low response rate managed appropriately? Yes

Study ID	Population ADHD Medications Mentioned	Findings—Misuse Patterns	Findings— Consequences	Risk of Bias
	% Female: 68 ADHD Medications Amphetamine and dextroamphetamine, Methylphenidate	Those identifying as female (0.72, 0.65–0.81) or other sex (0.63, 0.44–0.90) were significantly less likely to misuse, as were Black students (0.49, 0.34–0.70) and Asian/Pacific Islander students (0.63, 0.51–0.78) compared to White students. Why?: NR How acquired?: NR How frequent?: NR Mode of administration: NR	disorder/other addiction 1.79 (1.30, 2.46), and daytime sleepiness 1.18 (1.06–1.31). Polysubstance use: The odds of misuse were 5.5 times higher (CI 4.54–6.71) for students reporting past-month use of “Legal drugs” (cigarettes, alcohol, marijuana) and 8.0 times higher (CI 6.96–9.15) for students reporting past month use of “Illegal drugs” (cocaine, sedatives, hallucinogens, opiates, methamphetamine). Other: NR	

Abbreviations: ADHD = Attention-deficit/hyperactivity disorder; CI = 95% confidence interval; ED = emergency department; GPA = grade point average; N/A = not available; NMU = non-medical use; NR = not reported; NSUDH = National Survey on Drug Use and Health; OR = odds ratio; PI = Pacific Islander; PSM = prescription stimulant misuse; r = correlation co-efficient; SD = standard deviation; SUD = substance use disorder